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DANIEL WILSON, LL.D.,

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WITH AN APPENDIX ON ARCHÆOLOGY, BY E. B. TYLOR, F.R.S.,

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J. FITZGERALD, PUBLISHER,
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I. SCOPE OF THE SCIENCE.

ANTHROPOLOGY (the *science of man*, ἄνθρωπος, λόγος) denotes the natural history of mankind. In the general classification of knowledge it stands as the highest section of zoology or the science of animals, itself the highest section of biology or the science of living beings. To anthropology contribute various sciences, which hold their own independent places in the field of knowledge. Thus anatomy and physiology display the structure and functions of the human body, while psychology investigates the operations of the human mind. Philology deals with the general principles of language, as well as with the relations between the languages of particular races and nations. Ethics or moral science treats of man's duty or rules of conduct toward his fellowmen. Lastly, under the names of sociology and the science of culture, are considered the origin and development of arts and sciences, opinions, beliefs, customs, laws, and institutions generally among mankind, their course in time being partly marked out by the direct record of history, while beyond the historical limit our information is continued by inferences from relics of early ages and remote districts, to interpret which is the task of præ-historic archæology and geology. Not only are these various sciences concerned largely with man, but several among them have in fact suffered by the almost entire exclusion of other animals from their scheme. It is undoubted that comparative anatomy and physiology, by treating the human species as one member of a long series of related organisms, have gained a higher and more perfect understanding of man himself and his place in the universe than could have been gained by the narrower investigation of his species by and for itself. It is to be regretted that hitherto certain other sciences—psychology, ethics, and even philology and sociology—have so little followed so profitable an example. No doubt the phenomena of intellect appear in vastly higher and more complete organization in man than in beings below him in the scale of nature, that beasts and birds only attain to language in its lower rudiments, and that only the germs of moral tendency and social law are discernible among the lower animals. Yet though the mental and moral interval between man and the

nearest animals may be vast, the break is not absolute, and the investigation of the laws of reason and instinct throughout the zoological system, which is already casting some scattered rays of light on the study of man's highest organization, may be destined henceforth to throw brighter illumination into its very recesses. Now this condition of things, as well as the accepted order in which the sciences have arranged themselves by their mode of growth, make it desirable that anthropology should not too ambitiously strive to include within itself the sciences which provide so much of its wealth, but that each science should pursue its own subject through the whole range of living beings, rendering to anthropology an account of so much of its results as concerns man. Such results it is the office of anthropology to collect and co-ordinate, so as to elaborate as completely as may be the synopsis of man's bodily and mental nature, and the theory of his whole course of life and action from his first appearance on earth. As will be seen from the following summary, the information to be thus brought together from contributing sciences is widely different both in accuracy and in soundness. While much of the descriptive detail is already clear and well filled in, the general principles of its order are still but vaguely to be discerned, and as our view quits the comparatively distinct region near ourselves, the prospect fades more and more into the dimness of conjecture.

II. MAN'S PLACE IN NATURE.

It is now more than thirty years since Dr. Prichard, who perhaps of all others merits the title of founder of modern anthropology, stated in the following forcible passage, which opens his *Natural History of Man*, the closeness of man's physical relation to the lower animals :—

"The organized world presents no contrasts and resemblances more remarkable than those which we discover on comparing mankind with the inferior tribes. That creatures should exist so nearly approaching to each other in all the particulars of their physical structure, and yet differing so immeasurably in their endowments and capabilities, would be a fact hard to believe, if it were not manifest to our observation. The differences are everywhere striking: the resemblances are less obvious in the fullness of their extent, and they are never contemplated without wonder by those who, in the study of anatomy and physiology, are first made aware how near is man in his physical constitution to the brutes. In all the principles of his internal structure, in the composition and functions of his parts, man is but an animal. The lord of the earth, who contemplates the eternal order of the universe, and aspires to communion with its invisible Maker, is a being composed of the same materials, and framed on the same principles, as the creatures which he has tamed to be the servile instruments of his will, or slays for his daily food. The points of resemblance are innumerable; they extend to the most recondite arrangements of that mechanism which maintains instrumentally the physical life of the body, which brings forward its early development and admits, after a given period, its decay, and by means of which is prepared a succession of similar beings destined to perpetuate the race."

It is admitted that the higher apes come nearest to man in bodily formation, and that it is essential to determine their zoological resemblances and differences as a step toward ascertaining their absolute relation in nature. "At this point," writes Professor Owen in a paper on the "Osteology of the Apes," "every deviation from the human structure indicates with precision its real peculiarities, and we then possess the true means of appreciating those modifications by which a material organism is especially adapted to become the seat and instrument of a rational and responsible soul." (On the "Osteology of the Chimpanzee and Orang Utan," in *Proc. Zool. Soc.*, vol. i.) Professor Huxley, in his *Man's Place in Nature*, comparing man with order after order of the mammalia, decides "There would remain then but one order for comparison, that of the Apes (using that word in its broadest sense), and the question for discussion would nar-

row itself to this—is Man so different from any of these Apes that he must form an order by himself? Or does he differ less from them than they differ from one another, and hence must take his place in the same order with them?" This anatomist states the anatomical relations between man and ape in untechnical terms suited to the present purpose, and which would be in great measure accepted by zoologists and anthropologists, whether agreeing or not with his ulterior views. The relations are most readily stated in comparison with the gorilla, as on the whole the most anthropomorphous ape. In the general proportions of the body and limbs there is a marked difference between the gorilla and man, which at once strikes the eye. The gorilla's brain-case is smaller, its trunk larger, its lower limbs shorter, its upper limbs longer in proportion than those of man. The differences between a gorilla's skull and a man's are truly immense. In the gorilla, the face, formed largely by the massive jawbones, predominates over the brain-case or cranium; in the man these proportions are reversed. In man the occipital foramen, through which passes the spinal cord, is placed just behind the center of the base of the skull, which is thus evenly balanced in the erect posture, whereas the gorilla, which goes habitually on all fours, and whose skull is inclined forward, in accordance with this posture has the foramen further back. In man the surface of the skull is comparatively smooth, and the brow-ridges project but little, while in the gorilla these ridges overhang the cavernous orbits like penthouse roofs. The absolute capacity of the cranium of the gorilla is far less than that of man; the smallest adult human cranium hardly measuring less than 63 cubic inches, while the largest gorilla cranium measured had a content of only 34½ cubic inches. The large proportional size of the facial bones, and the great projection of the jaws, confer on the gorilla's skull its small facial angle and brutal character, while its teeth differ from man's in relative size and number of fangs. Comparing the lengths of the extremities, it is seen that the gorilla's arm is of enormous length, in fact about one-sixth longer than the spine, whereas a man's arm is one-fifth shorter than the spine; both hand and foot are proportionally much longer in the gorilla than in man; the leg does not so much differ. The vertebral column of the gorilla differs from that of man in its curvature and other characters, as also does the conformation of its narrow pelvis. The hand of the gorilla corresponds essentially as to bones and muscles with that of man, but is clumsier and heavier; its thumb is "opposable" like a human thumb, that is, it can easily meet with its extremity the extremities of the other fingers, thus possessing a character which does much to make the human hand so admirable an instrument; but the gorilla's thumb is proportionately shorter than man's. The foot of the higher apes, though often spoken of as a hand, is anatomically not such, but a prehensile foot. It is argued by Professor Owen and others that the position of the great toe converts the foot of the higher apes into a hand, an extremely important distinction from man; but against this Professor Huxley maintains that it has the characteristic structure of a foot, with a very movable great toe. The external unlikeness of the apes to man depends much on their hairiness, but this and some other characteristics have no great zoological value. No doubt the difference between man and the apes depends, of all things, on the relative size and organization of the brain. While similar as to their general arrangement to the human brain, those of the higher apes, such as the chimpanzee, are much less complex in their convolutions, as well as much less both in absolute and relative weight—the weight of a gorilla's brain hardly exceeding 20 ounces and a man's brain hardly weighing less than 32 ounces, although the go-

rilla is considerably the larger animal of the two.

These anatomical distinctions are undoubtedly of great moment, and it is an interesting question whether they suffice to place man in a zoological order by himself. It is plain that some eminent zoologists, regarding man as absolutely differing as to mind and spirit from any other animal, have had their discrimination of mere bodily differences unconsciously sharpened, and have been led to give differences, such as in the brain or even the foot of the apes and man, somewhat more importance than if they had merely distinguished two species of apes. Among the present generation of naturalists, however, there is an evident tendency to fall in with the opinion, that the anatomical differences which separate the gorilla or chimpanzee from man are in some respects less than those which separate these man-like apes from apes lower in the scale. Yet naturalists agree to class both the higher and lower apes in the same order. This is Professor Huxley's argument, some prominent points of which are the following:— As regards the proportion of limbs, the hylobates or gibbon is as much longer in the arms than the gorilla as the gorilla is than the man, while on the other hand, it is as much longer in the legs than the man as the man is than the gorilla. As to the vertebral column and pelvis, the lower apes differ from the gorilla as much as or more than, it differs from man. As to the capacity of the cranium, men differ from one another so extremely that the largest known human skull holds nearly twice the measure of the smallest, a larger proportion than that in which man surpasses the gorilla; while, with proper allowance for difference of size of the various species, it appears that some of the lower apes fall nearly as much below the higher apes. The projection of the muzzle, which gives the character of brutality to the gorilla as distinguished from the man, is yet further exaggerated in the lemurs, as is also the backward position of the occipital foramen. In characters of such importance as the structure of the hand and foot, the lower apes diverge extremely from the gorilla; thus the thumb ceases to be opposable in the American monkeys, and in the marmosets is directed forward, and armed with a curved claw like the other digits, the great toe in these latter being insignificant in proportion. The same argument can be extended to other points of anatomical structure, and, what is of more consequence, it appears true of the brain. A series of the apes, arranged from lower to higher orders, shows gradations from a brain little higher than that of a rat, to a brain like a small and imperfect imitation of a man's; and the greatest structural break in the series lies not between man and the man-like apes, but between the apes and monkeys on one side, and the lemurs on the other. On these grounds Professor Huxley, restoring in principle the Linnean classification, desires to include man in the order of *Primates*. This order he divides into seven families: first, the *Anthropini*, consisting of man only; second, the *Catarhini*, or Old World apes; third, the *Platyrhini*, all New World apes, except the marmosets; forth, the *Arctopithecini*, or marmosets; fifth, the *Lemurini*, or lemurs; sixth and seventh, the *Cheiromyini* and *Galeopithecini*. It seems likely that, so far as naturalists are disposed to class man with other animals on purely zoological grounds, some such classification as this may, in the present state of comparative anatomy, be generally adopted.

It is in assigning to man his place in nature on psychological grounds that the greater difficulty comes into view. The same naturalist, whose argument has just been summarized against an absolute structural line of demarkation between man and the creatures next in the scale, readily acknowledges an immeasurable and practically infinite divergence, ending in the present enormous gulf between

the family of apes and the family of man. To account for this intellectual chasm as possibly due to some minor structural difference, is, however, a view strongly opposed to the prevailing judgment. The opinion is deeply rooted in modern as in ancient thought, that only a distinctively human element of the highest import can account for the severance between man and the highest animal below him. Differences in the mechanical organs, such as the perfection of the human hand as an instrument, or the adaptability of the human voice to the expression of human thought, are indeed of great value. But they have not of themselves such value, that to endow an ape with the hand and vocal organs of a man would be likely to raise it through any large part of the interval that now separates it from humanity. Much more is to be said for the view that man's larger and more highly organized brain accounts for those mental powers in which he so absolutely surpasses the brutes.

The distinction does not seem to lie principally in the range and delicacy of direct sensation, as may be judged from such well-known facts as man's inferiority to the eagle in sight, or to the dog in scent. At the same time, it seems that the human sensory organs may have in various respects acuteness beyond those of other creatures. But, beyond a doubt, man possesses, and in some way possesses by virtue of his superior brain, a power of co-ordinating the impressions of his senses, which enables him to understand the world he lives in, and by understanding to use, resist, and even in a measure rule it. No human art shows the nature of this human attribute more clearly than does language. Man shares with the mammalia and birds the direct expression of the feelings by emotional tones and interjectional cries; the parrot's power of articulate utterance almost equals his own; and, by association of ideas in some measure, some of the lower animals have even learnt to recognize words he utters. But, to use words in themselves unmeaning, as symbols by which to conduct and convey the complex intellectual processes in which mental conceptions are suggested, compared, combined, and even analyzed, and new ones created—this is a faculty which is scarcely to be traced in any lower animal. The view that this, with other mental processes, is a function of the brain, is remarkably corroborated by modern investigation of the disease of aphasia, where the power of thinking remains, but the power is lost of recalling the word corresponding to the thought, and this mental defect is found to accompany a diseased state of a particular locality of the brain.* This may stand among the most perfect of the many evidences that, in Professor Bain's words, "the brain is the principal, though not the sole organ of mind." As the brains of vertebrate animals form an ascending scale, more and more approaching man's in their arrangement, the fact here finds its explanation, that lower animals perform mental processes corresponding in their nature to our own, though of generally less power and complexity. The full evidence of this correspondence will be found in such works as Brehm's *Thierleben;* and some of the salient points are set forth by Mr. Darwin, in the chapter on "Mental Powers," in his *Descent of Man*. Such are the similar effects of terror on man and the lower animals, causing the muscles to tremble, the heart to palpitate, the sphincters to be relaxed, and the hair to stand on end. The phenomena of memory, both as to persons and places, is strong in animals, as is manifest by their recognition of their masters, and their returning at once to habits disused for many years, but of which their brain has not lost the stored-up impressions. Such facts as that dogs "hunt in dreams," make it likely that their minds are not only sensible to actual events, present and past, but

* See "Diseases of Memory," by Th. Ribot, No. 46 HUMBOLDT LIBRARY.

can, like our minds, combine revived sensations into ideal scenes in which they are actors,—that is to say, they have the faculty of imagination. As for the reasoning powers in animals, the accounts of monkeys learning by experience to break eggs carefully, and pick off bits of shell, so as not to lose the contents, or of the way in which rats or martens after awhile can no longer be caught by the same kind of trap, with innumerable similar facts show in the plainest way that the reason of animals goes so far as to form by new experience a new hypothesis of cause and effect which will henceforth guide their actions. The employment of mechanical instruments, of which instances of monkeys using sticks and stones, and some other similar cases, furnish the only rudimentary traces among the lower animals, is one of the often quoted distinctive powers of man. With this comes the whole vast and ever-widening range of inventive and adaptive art, where the uniform hereditary instinct of the cell-forming bee and the nest-building bird are supplanted by multiform processes and constructions, often at first rude and clumsy in comparison to those of the lower instinct, but carried on by the faculty of improvement and new invention into ever higher stages. "From the moment," writes Mr. Wallace (*Natural Selection*, p. 325), "when the first skin was used as a covering, when the first rude spear was formed to assist in the chase, when fire was first used to cook his food, when the first seed was sown or shoot planted, a grand revolution was effected in nature, a revolution which in all the previous ages of the earth's history had had no parallel; for a being had arisen who was no longer necessarily subject to change with the changing universe,—a being who was in some degree superior to nature, inasmuch as he knew how to control and regulate her action, and could keep himself in harmony with her, not by a change in body, but by an advance of mind."

As to the lower instincts tending directly to self-preservation, it is acknowledged on all hands that man has them in a less developed state than other animals; in fact, the natural defenselessness of the human being, and the long-continued care and teaching of the young by the elders, are among the commonest themes of moral discourse. Parental tenderness and care for the young are strongly marked among the lower animals, though so inferior in scope and duration to the human qualities; and the same may be said of the mutual forbearance and defense which bind together in a rudimentary social bond the families and herds of animals. Philosophy seeking knowledge for its own sake; morality, manifested in the sense of truth, right, and virtue; and religion, the belief in and communion with superhuman powers ruling and pervading the universe, are human characters, of which it is instructive to trace, if possible, the earliest symptoms in the lower animals, but which can there show at most only faint and rudimentary signs of their wondrous development in mankind. That the tracing of physical and even intellectual continuity between the lower animals and our own race, does not necessarily lead the anthropologist to lower the rank of man in the scale of nature, cannot be better shown than by citing one of the authors of the development theory, Mr. A. R. Wallace (*op. cit.*, p. 324). Man, he considers, is to be placed "apart, as not only the head and culminating point of the grand series of organic nature, but as in some degree a new and distinct order of being."

To regard the intellectual functions of the brain and nervous system as alone to be considered in the psychological comparison of man with the lower animals, is a view satisfactory to those thinkers who hold materialistic views. According to this school, man is a machine, no doubt the most complex and wonderfully adapted of all known machines, but still neither more nor less than an instrument whose energy is provided by force

from without, and which, when set in action, performs the various operations for which its structure fits it, namely, to live, move, feel, and think. This doctrine, which may be followed up from Descartes's theory of animal life into the systems of modern writers of the school of Moleschott and Büchner, underlies the *Lectures on Man* of Professor Carl Vogt, one of the ablest of modern anthropologists (English translation published by Anthropological Society, London, 1864). Such views, however, always have been and are strongly opposed by those who accept on theological grounds a spiritualistic doctrine, or what is, perhaps, more usual, a theory which combines spiritualism and materialism in the doctrine of a composite nature in man, animal as to the body and in some measure as to the mind, spiritual as to the soul. It may be useful, as an illustration of one opinion on this subject, to continue here from an earlier page the citation of Dr. Prichard's comparison between man and the lower animals:—

"If it be inquired in what the still more remarkable difference consists, it is by no means easy to reply. By some it will be said that man while similar in the organization of his body to the lower tribes, is distinguished from them by the possession of an immaterial soul, a principle capable of conscious feeling, of intellect and thought. To many persons it will appear paradoxical to ascribe the endowment of a soul to the inferior tribes in the creation, yet it is difficult to discover a valid argument that limits the possession of an immaterial principle to man. The phenomena of feeling, of desire and aversion, of love and hatred, of fear and revenge, and the perception of external relations manifested in the life of brutes, imply, not only through the analogy which they display to the human faculties, but likewise from all that we can learn or conjecture of their particular nature, the superadded existence of a principle distinct from the mere mechanism of material bodies. That such a principle must exist in all beings capable of sensation, or of anything analogous to human passions and feelings, will hardly be denied by those who perceive the force of arguments which metaphysically demonstrate the immaterial nature of the mind. There may be no rational grounds for the ancient dogma that the souls of the lower animals were imperishable, like the soul of man; this is, however, a problem which we are not called upon to discuss; and we may venture to conjecture that there may be immaterial essences of divers kinds, and endowed with various attributes and capabilities. But the real nature of these unseen principles eludes our research: they are only known to us by their external manifestations. These manifestations are the various powers and capabilities, or rather the habitudes of action, which characterize the different orders of being, diversified according to their several destinations."

Dr. Prichard here puts forward distinctly the time-honored doctrine which refers the mental faculties to the operation of the soul. The view maintained by a distinguished comparative anatomist, Professor Mivart, in his *Genesis of Species*, ch. xii., may fairly follow. "Man, according to the old scholastic definition, is 'a rational animal' (*animal rationale*), and his animality is distinct in nature from his rationality, though inseparably joined, during life, in one common personality. Man's animal body must have had a different source from that of the spiritual soul which informs it, owing to the distinctness of the two orders to which those two existences severally belong." Not to pursue into its details a doctrine which has its place rather in a theological than an anthropological article, it remains to be remarked that the two extracts just given, however significant in themselves, fail to render an account of the view of the human constitution which would probably, among the theological and scholastic leaders of public opinion, count the largest weight of adherence. According to this view, not only life but thought are functions of the animal system, in which man excels all other animals as to height of organization; but beyond this, man embodies an immaterial and immortal spiritual principle which no lower creature possesses, and which makes the resemblance of the apes to him but a mocking simulance. To pronounce any absolute decision on these conflicting doctrines is foreign to our present purpose, which is to show that all of them count among their adherents men of high rank in science.

III. ORIGIN OF MAN.

AVAILABLE information on this great problem has been multiplied tenfold during the present generation, and the positive dicta of the older authorities are now more and more supplanted by hypotheses based on biological evidence. Opinion as to the genesis of man is divided between the theories of the two great schools of biology, that of creation and that of evolution. In both schools the ancient doctrine of the contemporaneous appearance on earth of all species of animals having been abandoned under the positive evidence of geology, it is admitted that the animal kingdom, past and present, includes a vast series of successive forms, whose appearances and disappearances have taken place at intervals during an immense lapse of ages. The line of inquiry has thus been directed to ascertaining what formative relation subsists among these species and genera, the last link of the argument reaching to the relation between man and the lower creatures preceding him in time. On both the theories here concerned it would be admitted, in the words of Agassiz (*Principles of Zoology*, pp. 205–6), that "there is a manifest progress in the succession of beings on the surface of the earth. This progress consists in an increasing similarity of the living fauna, and, among the vertebrates especially, in their increasing resemblance to man." Agassiz continues, however, in terms characteristic of the creationist school: "But this connection is not the consequence of a direct lineage between the faunas of different ages. There is nothing like parental descent connecting them. The fishes of the Palæozoic age are in no respect the ancestors of the reptiles of the Secondary age, nor does man descend from the mammals which preceded him in the Tertiary age. The link by which they are connected is of a higher and immaterial nature; and their connection is to be sought in the view of the Creator himself, whose aim in forming the earth, in allowing it to undergo the successive changes which geology has pointed out, and in creating successively all the different types of animals which have passed away, was to introduce man upon the surface of our globe. Man is the end toward which all the animal creation has tended from the first appearance of the first Palæozoic fishes." The evolutionist school, on the contrary, maintains that different successive species of animals are in fact connected by parental descent, having become modified in the course of successive generations. Mr. Darwin, with whose name and that of Mr. Wallace the modern development theory is especially associated, in the preface to his *Descent of Man* (1871), gives precedence among naturalists to Lamarck, as having long ago come to the conclusion "that man is the co-descendant with other species of some ancient, lower, and extinct form." Professor Huxley, remarking (*Man's Place in Nature*) on the crudeness and even absurdity of some of Lamarck's views, dates from Darwin the scientific existence of the development theory. The result of Darwin's application of this theory to man may be given in his own words (*Descent of Man*, part i. ch. 6):—

"The Catarhine and Platyrhine monkeys agree in a multitude of characters, as is shown by their unquestionably belonging to one and the same Order. The many characters which they possess in common can hardly have been independently acquired by so many distinct species; so that these characters must have been inherited. But an ancient form which possessed many characters common to the Catarhine and Platyrhine monkeys, and others in an intermediate condition, and some few perhaps distinct from those now present in either group, would undoubtedly have been ranked, if seen by a naturalist, as an ape or a monkey. And as man under a genealogical point of view belongs to the Catarhine or Old World stock, we must conclude, however much the conclusion may revolt our pride, that our early progenitors would have been properly thus designated. But we must not fall into the error of supposing that the early progenitor of the whole Simian stock, including man, was identical with, or even closely resembled, any existing ape or monkey."

The problem of the origin of man cannot be properly discussed apart from the full problem of the origin of species. The homologies between man and other animals which both schools try to account for; the explanation of the intervals, with apparent want of intermediate forms, which seem to the creationists so absolute a separation between species; the evidence of useless "rudimentary organs," such as in man the external shell of the ear, and the muscle which enables some individuals to twitch their ears, which rudimentary parts the evolutionists claim to be only explicable as relics of an earlier specific condition,—these, which are the main points of the argument on the origin of man, belong to general biology. The philosophical principles which underlie the two theories stand for the most part in strong contrast, the theory of evolution tending toward the supposition of ordinary causes, such as "natural selection," producing modifications in species, whether by gradual accumulation or more sudden leaps, while the theory of creation is prone to have recourse to acts of supernatural intervention (see the Duke of Argyll, *Reign of Law*, ch. v.). A theory has been propounded by Mr. Mivart (*Genesis of Species*, 1871) of a natural evolution of man as to his body, combined with a supernatural creation as to his soul; but this attempt to meet the difficulties on both sides seems at present not to have satisfied either. Anthropology waits to see whether the discovery of intermediate forms, which has of late years reduced so many asserted species to mere varieties, will go on till it produces a disbelief in any real separation between neighboring species, and especially whether geology can furnish traces of the hypothetical animal, man's near ancestor, but not as yet man. In the present state of the argument it may here suffice to have briefly indicated the positions held on either side. (Among other works relating to the development theory as applied to man, see Vogt, *Lectures on Man;* Haeckel, *Natürliche Schöpfungsgeschichte*, 2d ed., 1871.

IV. RACES OF MANKIND.

The classification of mankind into a number of permanent varieties or races, rests on grounds which are within limits not only obvious but definite. Whether from a popular or a scientific point of view, it would be admitted that a Negro, a Chinese, and an Australian, belong to three such permanent varieties of men, all plainly distinguishable from one another and from any European. Moreover, such a division takes for granted the idea which is involved in the word race, that each of these varieties is due to special ancestry, each race thus representing an ancient breed or stock, however these breeds or stocks may have had their origin. The anthropological classification of mankind is thus zoological in its nature, like that of the varieties or species of any other animal group, and the characters on which it is based are in great measure physical, though intellectual and traditional peculiarities, such as moral habit and language, furnish important aid. Among the best-marked race-characters are the following:—

The color of the skin has always been held as specially distinctive. The colored race-portraits of ancient Egypt remain to prove the permanence of complexion during a lapse of a hundred generations, distinguishing coarsely but clearly the types of the red-brown Egyptian, the yellow-brown Canaanite, the comparatively fair Libyan, and the Negro (see Wilkinson, *Ancient Eg.;* Brugsch, *Geogr. Inschr. Altägypt. Denkm.*, vol. ii.) These broad distinctions have the same kind of value as the popular terms describing white, yellow, brown, and black races, which often occur in ancient writings, and are still used. But for scientific purposes

greater accuracy is required, and this is now satisfactorily attained by the use of Dr. Broca's graduated series of colors as a standard (*Mémoires de la Société d'Anthropologie de Paris*, ii.). By this table the varieties of the human skin may be followed from the fairest hue of the Swede and the darker tint of the Provençal, to the withered-leaf brown of the Hottentot, the chocolate brown of the Mexican, and the brown-black of the West-African. The color of the eyes and hair is also to be defined accurately by Broca's table. This affords, however, less means of distinction, from the extent in which dark tints of hair and iris are common to races whose skins are more perceptibly different; yet some varieties are characteristic, such as the blue eyes and flaxen hair of the fair race of Northern Europe.

As to the hair, its structure and arrangement is a better indication of race than its tint. The hair differs in quantity between scantiness on the body of the Mongul and profusion on the body of the Aino; while as to the arrangement on the scalp, the tufts of the Bushman contrast with the more equal distribution on the European head. The straight hair of the North American or Malay is recognizable at once as different from the waving or curling hair of the European and both from the naturally frizzed hair of the Negro. These marked differences are due to the structure of the hair, which, examined in sections under the microscope, varies from the circular section proper to the straight-haired races, to the more or less symmetrically oval or reniform sections belonging to races with curled and twisted hair (see Pruner-Bey in *Mém. de la Soc. Anthrop.*, vol. ii.).

Stature is by no means a general criterion of race, and it would not, for instance, be difficult to choose groups of Englishmen, Kafirs, and North American Indians, whose mean height should hardly differ. Yet in many cases it is a valuable means of distinction, as between the tall Patagonians and the stunted Fuegians, and even as a help in minuter problems, such as separating the Teutonic and Keltic ancestry in the population of England (see Beddoe, "Stature and Bulk of Man in the British Isles," in *Mem. Anthrop. Soc. London*, vol. iii.). Proportions of the limbs, compared in length with the trunk, have been claimed as constituting peculiarities of African and American races; and other anatomical points, such as the conformation of the pelvis, have speciality. But inferences of this class have hardly attained to sufficient certainty and generality to be set down in the form of rules.

The conformation of the skull is second only to the color of the skin as a criterion for the distinction of race. The principal modes of estimating the differences of skulls are the following:—The skull being seen from above, the proportions of the two diameters are estimated on the principle employed by Retzius: taking the longer diameter from front to back as 100, if the shorter or cross diameter falls below 80, the skull may be classed as long (dolichocephalic); while if it exceeds 80, the skull may be classed as broad (brachycephalic); or a third division may be introduced between these as intermediate (Mesocephalic), comprehending skulls with a proportionate breadth of 75 to 80, or thereabout. The percentage of breadth to length measured in this manner is known as the cephalic index; thus, the cephalic index of a Negro or Australian may be as low as 72, and that of a Tatar as high as 88, while the majority of Europeans have an index not departing in either direction very far from 78. The cephalic height is measured in the same way as a percentage of the length. The back view (norma occipitalis) of the skull is distinguished as rounded, pentagonic, etc., and the base view of the skull shows the position of the occipital foramen and the zygomatic arches. The position of the jaws is recognized as important, races being described as prognathous when the jaws project far, as in the Australian

or Negro, in contradistinction to the orthognathous type, which is that of the ordinary well-shaped European skull. On this distinction in great measure depends the celebrated "facial angle," measured by Camper as a test of low and high races; but this angle is objectionable as resulting partly from the development of the forehead and partly from the position of the jaws. The capacity of the cranium is estimated in cubic measure by filling it with sand, etc., with the general result that the civilized white man is found to have a larger brain than the barbarian or savage.

Classification of races on cranial measurements has long been attempted by eminent anatomists, such as Blumenbach and Retzius, while the later labors of Von Baer, Welcker, Davis, Broca, Busk, Lucae, and many others, have brought the distinctions to extreme minuteness. In certain cases great reliance may be placed on such measurements. Thus the skulls of an Australian and a Negro would be generally distinguished by their narrowness and the projection of the jaw from that of any Englishman; while, although both the Australian and Negro are thus dolichocephalic and prognathous, the first would usually differ perceptibly from the second in its upright sides and strong orbital ridges. The relation of height to breadth may furnish a valuable test; thus both the Kafir and the Bushman are dolichocephalic, with an index of about 72, but they differ in the index of height, which may be 73 and 71 respectively, in the one case more than the width and in the other less. It is, however, acknowledged by all experienced craniologists, that the shape of the skull may vary so much within the same tribe, and even the same family, that it must be used with extreme caution, and if possible only in conjunction with other criteria of race.

The general contour of the face, in part dependent on the form of the skull, varies much in different races, among whom it is loosely defined as oval, lozenge-shaped, pentagonal, etc. Of particular features, some of the most marked contrasts to European types are seen in the oblique Chinese eyes, the broad-set Kamchadal cheeks, the pointed Arab chin, the snub Kirghis nose, the fleshy protuberant Negro lips, and the broad Kalmuk ear. Taken altogether, the features have a typical character which popular observation seizes with some degree of correctness, as in the recognition of the Jewish countenance in a European city.

The state of adaptation in which each people stands to its native climate forms a definite race-character. In its extreme form this is instanced in the harmful effect of the climate of India on children of European parents, and the corresponding danger in transporting natives of tropical climates to England. Typical instances of the trelation of race-constitutions to particular diseases are seen in the liability of Europeans in the West Indies to yellow fever, from which Negroes are exempt, and in the habitation by tribes in India of so-called "unhealthy districts," whose climate is deadly to Europeans, and even to natives of neighboring regions. Even the vermin infesting different races of men are classified by Mr. A. Murray (*Trans. R. Soc. Edin.*, vol. xxii.) as distinct.

The physical capabilities of different races are known to differ widely, but it is not easy to discriminate here between hereditary race-differences and those due to particular food and habit of life. A similar difficulty has hitherto stood in the way of any definite classification of the emotional, moral, and intellectual characters of races. Some of the most confident judgments which have been delivered on this subject have been dictated by prejudice or wilful slander, as in the many lamentable cases in which slaveholders and conquerors have excused their ill-treatment of subject and invaded races on the ground of their being creatures of bestial nature in mind and morals. Two of the best-

marked contrasts of mental type recorded among races are Mr. A. R. Wallace's distinction between the shy, reserved, and impassive Malay and the sociable and demonstrative Papuan (*Tr. Eth. Soc.*, vol iii. p. 200), and the very similar difference pointed out by Spix and Martius between the dull and morose natives of the Brazilian forests, and the lively sensuous African Negroes brought into contact with them (*Reise in Brasilien*, vol. i.) In general, however, descriptions of national or racial character are so vitiated by the confusion of peculiarity of natural character with stage of civilization, that they can only be made use of with the greatest reserve.

The relation of language to race is discussed below. (Section VI.)

Were the race-characters indicated in the foregoing paragraphs constant in degree or even in kind, the classification of races would be an easy task. In fact it is not so, for every division of mankind presents in every character wide deviations from a standard. Thus the Negro race, well marked as it may seem at the first glance, proves on closer examination to include several shades of complexion and features, in some districts varying far from the accepted Negro type; while the examination of a series of native American tribes shows that, notwithstanding their asserted uniformity of type, they differ in stature, color, features, and proportions of skull. (See Prichard, *Nat. Hist. of Man;* Waitz, *Anthropology*, part i. sec. 5.). Detailed anthropological research, indeed, more and more justifies Blumenbach's words, that "innumerable varieties of mankind run into one another by insensible degrees." This state of things, due partly to mixture and crossing of races, and partly to independent variation of types, makes the attempt to arrange the whole human species within exactly bounded divisions an apparently hopeless task. It does not follow, however, that the attempt to distinguish special races should be given up, for there at least exist several definable types, each of which so far prevails in a certain population as to be taken as its standard. M. Quetelet's plan of defining such types will probably meet with general acceptance as the scientific method proper to this branch of anthropology. It consists in the determination of the standard, or typical "mean man" (*homme moyen*) of a population, with reference to any particular quality, such as stature, weight, complexion, etc. In the case of stature, this would be done by measuring a sufficient number of men, and counting how many of them belong to each height on the scale. If it be thus ascertained, as it might be in an English district, that the 5 ft. 7 in. men form the most numerous group, while the 5 ft. 6 in. and 5 ft. 8 in. men are less in number, and the 5 ft. 5 in. and 5 ft. 9 in. still fewer, and so on until the extremely small number of extremely short or tall individuals of 5 ft. or 7 ft. is reached, it will thus be ascertained that the stature of the mean or typical man is to be taken as 5 ft. 7 in. The method is thus that of selecting as the standard the most numerous group, on both sides of which the groups decrease in number as they vary in type. Such classification may show the existence of two or more types in a community, as, for instance, the population of a Californian settlement made up of Whites and Chinese might show two predominant groups (one of 5 ft. 8 in., the other of 5 ft. 4 in.) corresponding to these two racial types. It need hardly be said that this method of determining the mean type of a race, as being that of its really existing and most numerous class, is altogether superior to the mere calculation of an average, which may actually be represented by comparatively few individuals, and those the exceptional ones. For instance, the average stature of the mixed European and Chinese population just referred to might be 5 ft. 6 in.—a worthless and, indeed, misleading result. (For particulars of Quetelet's method, see his *Physique Sociale*, 1869, and *Anthropométrie*, 1870.) The

measurement and description of the various races of men are now carried to great minuteness (the tables in Scherzer and Schwarz, *Reise der Novara*, and those of Fritsch, *Die Eingeborenen Süd-Afrika's*, 1872, may be cited as examples of modern method), so that race-classification is rapidly improving as to both scope and accuracy. Even where comparatively loose observations have been made, it is possible, by inspection of considerable numbers of individuals, to define the prevalent type of a race with tolerable approximation to the real mean or standard man. It is in this way that the subdivision of mankind into races, so far as it has been done to any purpose, has been carried out by anthropologists.

These classifications have been numerous, and though, regarded as systems, most of them are now seen at the first glance to be unsatisfactory, yet they have been of great value in systematizing knowledge, and are all more or less based on indisputable distinctions. Blumenbach's division, though published nearly a century ago (1781), has had the greatest influence. He reckons five races, viz., Caucasian, Mongolian, Ethiopian, American, Malay (see the collected edition of his *Treatises*, p. 264, published by the Anthropological Society). The ill-chosen name of Caucasian, used by Blumenbach to denote what may be called white men, is still current; it brings into one race peoples such as the Arabs and Swedes, although these are scarcely less different than the Americans and Malays, who are set down as two distinct races. Again, two of the best-marked varieties of mankind are the Australians and the Bushmen, neither of whom, however, seem to have a natural place in Blumenbach's series. The yet simpler classification by Cuvier into Caucasian, Mongol, and Negro, corresponds in some measure with a division by mere complexion into white, yellow, and black races; but neither this threefold division, nor the ancient classification into Semitic, Hamitic, and Japhetic nations can be regarded as separating the human types either justly or sufficiently (see Prichard, *Natural History of Man*, sec. 15; Waitz, *Anthropology*, vol. i. part i. sec. 5). Schemes which set up a larger number of distinct races, such as the eleven of Pickering, the fifteen of Bory de St. Vincent, and the sixteen of Desmoulins, have the advantage of finding niches for most well-defined human varieties; but no modern naturalist would be likely to adopt any one of these as it stands. In criticism of Pickering's system, it is sufficient to point out that he divides the white nations into two races, entitled the Arab and the Abyssinian (Pickering, *Races of Man*, chap. i.) Agassiz, Nott, Crawfurd, and others who have assumed a much larger number of races or species of man, are not considered to have satisfactorily defined a corresponding number of distinguishable types. On the whole, Professor Huxley's recent scheme (*Journal of the Ethnological Society*, vol. ii. p. 404, 1870) probably approaches more nearly than any other to such a tentative classification as may be accepted in definition of the principal varieties of mankind, regarded from a zoological point of view, though anthropologists may be disposed to erect into separate races several of his widely-differing subraces. He distinguishes four principal types of mankind, the Australioid, Negroid, Mongoloid, and Xanthochroic, adding a fifth variety, the Melanochroic.

The special points of the Australioid are a chocolate-brown skin, dark brown or black eyes, black hair (usually wavy), narrow (dolichocephalic) skull, brow-ridges strongly developed, projecting jaw, coarse lips, and broad nose. This type is best represented by the natives of Australia, and next to them, by the indigenous tribes of Southern India, the so-called coolies. The Egyptians to some degree approach this type; they are, however, held by good authorities to be a modified African race.

The Negroid type is primarily represented by the Negro of Africa, between the Sahara and the Cape district, including Madagascar. The skin varies from dark brown to brown-black, with eyes of similar dark hue, and hair usually black, and always crisp or woolly. The skull is narrow (dolichocephalic), with orbital ridges not prominent, prognathous, with depressed nasal bones, causing the nose to be flat as well as broad; and the lips are coarse and projecting. Two important families are classed in this system as special modifications of the Negroid type. First, the Bushman of South Africa is diminutive in stature, and of yellowish-brown complexion; the Hottentot is supposed to be the result of crossing between the Bushman and ordinary Negroid. Second, the Negritos of the Andaman Islands, the peninsula of Malacca, the Philippines and other islands, to New Caledonia and Tasmania, are mostly dolichocephalic, with dark skins and woolly hair. In various districts they tend toward other types, and show traces of mixture.

The Mongoloid type prevails over the vast area lying east of a line drawn from Lapland to Siam. Its definition includes a short, squat build, a yellowish brown complexion, with black eyes and black straight hair, a broad (brachycephalic) skull, usually without prominent brow-ridges, flat small nose, and oblique eyes. The dolichocephalic Chinese and Japanese in other respects correspond. Various other important branches of the human species are brought into connection with the Mongoloid type, though on this view the differences they present raise difficult problems of gradual variation, as well as of mixture of race; these are the Dyak-Malys, the Polynesians, and the Americans.

The Xanthochroi, or fair whites—tall, with almost colorless skin, blue or gray eyes, hair from straw color to chestnut, and skulls varying as to proportionate width—are the prevalent inhabitants of Northern Europe, and the type may be traced into North Africa, and eastward as far as Hindostan. On the south and west it mixes with that of the Melanochroi, or dark whites, and on the north and east with that of the Mongoloids.

The Melanochroi, or dark whites, differ from the fair whites in the darkening of the complexion to brownish and olive, and of the eyes and hair to black, while the stature is somewhat lower and the frame lighter. To this class belong a large part of those classed as Kelts, and of the populations of Southern Europe, such as Spaniards, Greeks, and Arabs, extending as far as India; while endless intermediate grades between the two white types testify to ages of intermingling. Professor Huxley is disposed to account for the Melanochroi as themselves the result of crossing between the Xanthochroi and the Australioids. Whatever ground there may be for his view, it is obviously desirable to place them in a class by themselves, distinguishing them by an appropriate name.

In determining whether the races of mankind are to be classed as varieties of one species, it is important to decide whether every two races can unite to produce fertile offspring. It is settled by experience that the most numerous and well-known crossed races, such as the Mulattos, descended from Europeans and Negroes—the Mestizos, from Europeans and American indigenes—the Zambos, from these American indigenes, and Negroes, etc., are permanently fertile. They practically constitute sub-races, with a general blending of the characters of the two parents, and only differing from fully established races in more or less tendency to revert to one or other of the original types. It has been argued, on the other hand, that not all such mixed breeds are permanent, and especially that the cross between Europeans and Australian indigenes is almost sterile; but this assertion, when examined with the care demanded by its bearing on the general question of hybridity, has distinctly broken down. On the

whole, the general evidence favors the opinion that any two races may combine to produce a new sub-race, which again may combine with any other variety. (See Waitz, *Anthropology*, vol. i. part i. sec. 3; Darwin, *Descent of Man*, part i. ch. 7; Prichard, *Nat. Hist. of Man*, sect. 5; on the other hand, Broca, *Phenomena of Hybridity in the Genus Homo*, 1864.) Thus, if the existence of a small number of distinct races of mankind be taken as a starting-point, it is obvious that their crossing would produce an indefinite number of secondary varieties, such as the population of the world actually presents. The working out in detail of the problem, how far the differences among complex nations, such as those of Europe, may have been brought about by hybridity, is still, however, a task of almost hopeless intricacy. Among the boldest attempts to account for distinctly-marked populations as resulting from the intermixture of two races, are Professor Huxley's view that the Hottentots are hybrid between the Bushmen and the Negroes, and his more important suggestion, that the Melanochroic peoples of Southern Europe are of mixed Xanthochroic and Australioid stock.

The problem of ascertaining how the small number of races, distinct enough to be called primary, can have assumed their different types, has been for years the most disputed field of anthropology, the battle-ground of the rival schools of monogenists and polygenists. The one has claimed all mankind to be descended from one original stock, and generally from a single pair; the other has contended for the several primary races being separate species of independent origin. It is not merely as a question of natural history that the matter has been argued. Biblical authority has been appealed to, mostly on the side of the monogenists, as recording the descent of mankind from a single pair. (See, for example, Horne's *Introduction to the Scriptures;* the Speaker's Commentary, Gen. i.) On the other hand, however, the polygenists not less confidently claim passages from which they infer the existence of non-Adamite, as well as Adamite races of man. (See, for example, R. S. Poole, *Genesis of the Earth and Man.*) Nor have political considerations been without influence, as where, for instance, one American school of ethnologists have been thought to have formed, under the bias of a social system recognizing slavery, their opinion that the Negro and the white man are of different species. (See Morton, *Crania Americana*; Nott and Gliddon, *Types of Mankind.*) Of the older school of scientific monogenists, Blumenbach and Prichard are eminent representatives, as is Quatrefages of the more modern. The great problem of the monogenist theory is to explain by what course of variation the so different races of man have arisen from a single stock. In ancient times little difficulty was felt in this, authorities such as Aristotle and Vitruvius seeing in climate and circumstance the natural cause of racial differences, the Ethiopian having been blackened by the tropical sun, etc. Later and closer observations, however, have shown such influences to be, at any rate, far slighter in amount and slower in operation than was once supposed. M. de Quatrefages brings forward (*Unité de l'Espèce Humaine*, Paris, 1861, ch. 13) his strongest arguments for the variability of races under change of climate, etc., (*action du milieu,*) instancing the asserted alteration in complexion, constitution, and character of Negroes in America, and Englishmen in America and Australia. But although the reality of some such modification is not disputed, especially as to stature and constitution, its amount is not enough to upset the counter-proposition of the remarkable permanence of type displayed by races ages after they have been transported to climates extremely different from that of their former home. Moreover, physically different races, such as the Bushmen and Negroids in Africa, show no signs of approximation under the influence of the

same climate; while, on the other hand, the coast tribes of Tierra del Fuego and forest tribes of tropical Brazil continue to resemble one another, in spite of extreme differences of climate and food. Mr. Darwin, than whom no naturalist could be more competent to appraise the variation of a species, is moderate in his estimation of the changes produced on races of man by climate and mode of life within the range of history. (*Descent of Man*, part i. ch. 4 and 7). The slightness and slowness of variation in human races having become known, a great difficulty of the monogenist theory was seen to lie in the shortness of the chronology with which it was formerly associated. Inasmuch as several well-marked races of mankind, such as the Egyptian, Phœnician, Ethiopian, etc., were much the same three or four thousand years ago as now, their variation from a single stock in the course of any like period could hardly be accounted for without a miracle. This difficulty was escaped by the polygenist theory, which, till a few years since, was gaining ground. (See Pouchet, *Plurality of the Human Race*, 2d ed., 1864, Introd.) Two modern views have, however, intervened which have tended to restore, though under a new aspect, the doctrine of a single human stock. One has been the recognition of man having existed during a vast period of time (see sec. IV., *Antiquity of Man*), which made it more easy to assume the continuance of very slow natural variation as having differenced even the white man and the Negro among the decendants of a common progenitor. The other view is that of the evolution or development of species, at the present day so strongly upheld among naturalists. It does not follow necessarily from a theory of evolution of species that mankind must have descended from a single stock, for the hypothesis of development admits of the argument, that several simious species may have culminated in several races of man (Vogt, *Lectures on Man*, London, 1864, p. 463). The general tendency of the development theory, however, is against constituting separate species where the differences are moderate enough to be accounted for as due to variation from a single type. Mr. Darwin's summing up of the evidence as to unity of type throughout the races of mankind is as distinctly a monogenist argument as those of Blumenbach, Prichard, or Quatrefages—

> "Although the existing races of man differ in many respects, as in color, hair, shape of skull, proportions of the body, etc., yet, if their whole organization be taken in consideration they are found to resemble each other closely in a multitude of points. Many of these points are of so unimportant, or of so singular a nature, that it is extremely improbable that they should have been independently acquired by aboriginally distinct species or races. The same remark holds good with equal or greater force with respect to the numerous points of mental similarity between the most distinct races of man. . . . Now, when naturalists observe a close agreement in numerous small details of habits, tastes, and dispositions between two or more domestic races, or between nearly allied natural forms, they use this fact as an argument that all are descended from a common progenitor, who was thus endowed; and, consequently, that all should be classed under the same species. The same argument may be applied with much force to the races of man."—(Darwin, *Descent of Man*, part i. ch. 7.)

A suggestion by Mr. A. R. Wallace has great importance in the application of the development theory to the origin of the various races of man; it is aimed to meet the main difficulty of the monogenist school, how races which have remained comparatively fixed in type during the long period of history, such as the white man and the Negro, should have, in even a far longer period, passed by variation from a common original. Mr. Wallace's view is substantially that the remotely ancient representatives of the human species, being as yet animals too low in mind to have developed those arts of maintenance and social ordinances by which man holds his own against influences from climate and circumstance, were in their then wild state much more plastic than

now to external nature; so that "natural selection" and other causes met with but feeble resistance in forming the permanent varieties or races of man, whose complexion and structure still remain fixed in their descendants. (See Wallace, *Contributions to the Theory of Natural Selection*, p. 319.) On the whole, it may be asserted that the doctrine of the unity of mankind now stands on a firmer basis than in previous ages. It would be premature to judge how far the problem of the origin of races may be capable of exact solution; but the experience of the last few years countenances Mr. Darwin's prophecy, that before long the dispute between the monogenists and the polygenists will die a silent and unobserved death.

V. ANTIQUITY OF MAN.

It was until of late years commonly held among the educated classes, that man's first appearance on earth might be treated on a historical basis as matter of record. It is true that the schemes drawn up by chronologists differed widely, as was naturally the case, considering the variety and inconsistenty of their documentary data. On the whole, the scheme of Archbishop Usher, who computed that the earth and man were created in 4004 B.C., was the most popular. It is no longer necessary, however, to discuss these chronologies, inasmuch as new evidence has so changed the aspect of the subject, that the quasi-historical schemes of the last century would now hardly be maintained by any competent authority of any school. Geology, notwithstanding the imperfection of its results, has made it manifest that our earth must have been the seat of vegetable and animal life for an immense period of time; while the first appearance of man, though comparatively recent, is positively so remote, that an estimate between twenty and a hundred thousand years may fairly be taken as a minimum. This geological claim for a vast antiquity of the human race is supported by the similar claims of prehistoric archæology and the science of culture, the evidence of all three departments of inquiry being intimately connected, and in perfect harmony.

During the last half century, the fact has been established that human bones and objects of human manufacture occur in such geological relation to the remains of fossil species of elephant, rhinoceros, hyæna, bear, etc., as to lead to the distinct inference that man already existed during the ancient period of these now extinct mammalia. The not quite conclusive researches of MM. Tournal and Christol in limestone caverns of the south of France date back to 1828. About the same time Dr. Schmerling of Liége was exploring the ossiferous caverns of the valley of the Meuse, and satisfied himself that the men whose bones he found beneath the stalagmite floors, together with bones cut and flints shaped by human workmanship, had inhabited this Belgian district at the same time with the cave-bear and several other extinct animals whose bones were imbedded with them (*Recherches sur les Ossements fossiles découverts dans les Cavernes de la Province de Liége*, Liége, 1833–34). This evidence, however, met with little acceptance among scientific men. Nor, at first, was more credit given to the discovery by M. Boucher de Perthes, about 1841, of rude flint hatchets in a sand-bed containing remains of mammoth and rhinoceros at Menchecourt near Abbeville, which first find was followed by others in the same district (see Boucher de Perthes, *De l'Industrie Primitive, ou les Arts à leur Origine*, 1846; *Antiquités Celtiques et Antédiluviennes*, Paris, 1847, etc.); between 1850 and 1860 competent French and English geologists, among them Rigollot, Falconer, Prestwich, and Evans, were induced to examine into the facts, and found the evidence irresistible that man existed and used rude imple-

ments of chipped flint during the Quaternary or Drift period. Further investigations were now made, and overlooked results of older ones reviewed. In describing Kent's Hole, near Torquay, Mr. Godwin-Austen had maintained, as early as 1840 (*Proc. Geo. Soc. London*, vol. iii. p. 286), that the human bones and worked flints had been deposited indiscriminately together with the remains of fossil elephant, rhinoceros, etc.; a minute exploration of this cavern has since been carried on under the superintendence of Messrs. Vivian, Pengelly, and others, fully justifying Mr. Godwin-Austen's early remark, that "there is no *a priori* reason why man and the several animals whose remains occur in caves and in gravel should not have lived here at some remote time" (see Pengelly, "Literature of Kent's Cavern," in *Trans. Devonshire Association*, 1868). Especially certain caves and rock-shelters in the province of Dordogne, in central France, were examined by a French and an English archæologist, Mons. Edouard Lartet and Mr. Henry Christy, the remains discovered showing the former prevalence of the rein-deer in this region, at that time inhabited by savages, whose bone and stone implements indicate a habit of life similar to that of the Esquimaux. Moreover, the co-existence of man with a fauna now extinct or confined to other districts was brought to yet clearer demonstration, by the discovery in these caves of certain drawings and carvings of the animals done by the ancient inhabitants themselves, such as a group of rein-deer on a piece of rein-deer horn, and a sketch of a mammoth, showing this elephant's long hair, on a piece of a mammoth's tusk from La Madeleine (Lartet and Christy, *Reliquiæ Aquitanicæ*, ed. by T. R. Jones, London, 1865, etc.). These are among the earliest and principal of a series of discoveries of human relics belonging to what may be termed geological antiquity, with which should be mentioned Mr. Boyd Dawkins's examination of the hyæna den of Wokey Hole, Dr. Lund's researches in the caves of Brazil, those in the south of France by the Marquis de Vibraye and MM. Garrigou and Filhol, those in Sicily by Dr. Falconer, and Mr. Bruce Foote's discovery of rude quartzite implements in the laterite of India. Fuller details of the general subject will be found in Sir C. Lyell's *Antiquity of Man*, 4th ed., London, 1873; Sir John Lubbock's *Prehistoric Times*, 3d ed., London, 1873; Dr. H. Falconer's *Palæontological Memoirs*, London, 1868; the volumes of *Proceedings of the International Congress of Prehistoric Archæology*; and the periodical *Matériaux pour l'Histoire Primitive et Naturelle de l'Homme*, edited at first by De Mortillet, and since by Trutat and Cartailhac.

This evidence is now generally accepted by geologists as carrying back the existence of man into the period of the post-glacial drift, in what is now called the Quaternary period. That this indicates an antiquity at least of tens of thousands of years may be judged in several ways. The very position in which these rude instruments were found showed that they belonged to a time quite separate from that of history. Thus, at St. Acheul flint hatchets occur in a gravel-bed immediately overlying the chalk, which bed is covered by some 12 feet of sand and marl, capped by a layer of soil, which is shown by graves of the Gallo-Roman period to have been hardly altered during the last 1500 years. This distinction between the drift deposits and those containing relics of historic ages is, as a general rule evident at a glance. Next, the succession of ages to which different classes of remains belong is well marked; the drift implements belong to the palæolithic or old stone age, when as yet the implements were extremely rude, and not ground or polished; above these in deposit, and therefore later in time, come the artistically shaped and polished celts of the neolithic or new stone age; above these, again, relics of the

bronze and early iron ages, with which historical antiquity in Europe begins. Again, the animals of the Quaternary period, whose bones are found with the rude stone implements, comprise several species of mammalia which have since become extinct, such as the mammoth, the hairy rhinoceros, and the Irish elk, while others, such as the rein-deer and musk-ox, now only inhabit remote districts. It is generally considered that such a fauna indicates, at any rate during part of the Quaternary period, a severer climate than now prevails in France and England. This difference from the present conditions seems to confirm the view, that the twenty centuries of French and English history form but a fraction of the time which has elapsed since the stone implements of prehistoric tribes were first buried under beds of gravel and sand by the rivers now represented by the Thames or the Somme. Still vaster, however, is the idea of antiquity suggested by the geographical conformation of such valleys as those in which these rivers flow. The drift-beds lie on their sides often 100 to 200 feet, and even more, above the present flood-levels. As such highest deposits seem to mark the time when the rivers flowed at heights so far above the present channels, it follows that the drift-beds, and the men whose works they enclose, must have existed during a great part of the time occupied by the rivers in excavating their valleys down to their present beds. Granting it as possible that the rivers by which this enormous operation was performed were of greater volume and proportionately still greater power in flood-time than the present streams, which seem so utterly inadequate to their valleys, and granting also, that under different conditions of climate the causing of debâcles by ground-ice may have been a powerful excavating agent, nevertheless, with all such allowances the reckoning of ages seems vastly out of proportion to historical chronology. It is not convenient to discuss here Mr. Prestwich's division of the drift gravels into high and low level beds, nor Mr. A. Tylor's argument against this division, nor the latter's theory of a Pluvial period succeeding the Glacial period (see *Quart. Journ. Geol. Soc.*, vol. xxiv. part 2, vol. xxv. part 1). The geology of the Quaternary or Post-tertiary gravels, on which the geological argument for the high antiquity of man mainly rests, has been especially treated by Prestwich in the *Philos. Trans.*, 1860, p. 277, and 1864, p. 247; see also J. Evans, *Ancient Stone Impts.*, ch. 25; references to the writings of other geologists will be found in the already mentioned works of Lyell and Lubbock.

Beside these arguments, which suggest high antiquity rather than offer means of calculation, certain inferences (accounts of which are also given in the last-named works) have been tentatively made from the depth of mud, earth, peat, etc., which has accumulated above relics of human art imbedded in ancient times. Among these is Mr. Horner's argument from the numerous borings made in the alluvium of the Nile valley to a depth of 60 feet, where down to the lowest level fragments of burnt brick and pottery were always found, showing that people advanced enough in the arts to bake brick and pottery have inhabited the valley during the long period required for the Nile inundations to deposit 60 feet of mud, at a rate probably not averaging more than a few inches in a century. Another argument is that of Professor von Morlot, based on a railway section through a conical accumulation of gravel and alluvium, which the torrent of the Tinière has gradually built up where it enters the Lake of Geneva near Villeneuve. Here three layers of vegetable soil appear, proved by the objects imbedded in them to have been the successive surface-soils in two prehistoric periods and in the Roman period, and which now lie 4, 10, and 19 feet underground; on this

it is computed that if 4 feet of soil were formed in the 1500 years since the Roman period, we must go 5000 years farther back for the date of the earliest human inhabitants. Calculations of this kind, loose as they are, deserve attention.

The interval between the Quaternary or Drift period and the period of historical antiquity is to some extent bridged over by relics of various intermediate civilizations, mostly of the lower grades, and in some cases reaching back to remote dates. The lake dwellings of Switzerland are perhaps among the more recent of these. They were villages of huts built on piles in the water at some distance from the shore, for security from attack—in fact, fortified water settlements of the same nature as those of Lake Prasias in the time of Herodotus, and as those still inhabited in New Guinea and West Africa. The remains of these Swiss villages are found with the stumps of the piles still standing, often imbedded in an accumulation of mud or growth of peat which has preserved a kind of illustrative museum of the arts and habits of the lake men. From examination of the sites, it appears that the settlements are of various dates, from the neolithic or polished stone period, when instruments of metal were still unknown, to the time when bronze was introduced, and beyond this into the later age marked by the use of iron. A few of the lake villages lasted on till the Roman dominion, as is proved by the presence of Roman coins and pottery, but they were soon afterward abandoned, so that their very existence was forgotten, and their rediscovery only dates from 1853, when the workmen excavating a bed of mud on the shore of the Lake of Zurich found themselves standing among the piles of a lake settlement. In Germany, Italy, and other countries, similar remains of a long pre-Roman civilization have been found. (The special works on lake habitations are Dr. Keller's *Lake Dwellings*, translated by J. E. Lee, London, 1866; and Troyon's *Habitations Lacustres*.) Indications of man's antiquity, extending farther back into prehistoric times, are furnished by the Danish shell-heaps or "kjökkenmödding," which term, meaning "kitchen refuse-heap," has been Anglicized in "kitchen midden" (the word "midden," a dung-heap, being still current in the north of England). Along the shores of nearly all the Danish islands extensive beds or low mounds, like raised beaches, may be seen, consisting chiefly of innumerable cast-away shells, intermingled with bones, etc. Such shell-heaps are found in all quarters of the globe by the sea-shore, and may be sometimes seen in process of formation; they are simply the accumulations of shells and refuse thrown away near the huts of rude tribes subsisting principally on shell-fish. The Danish kitchen middens, however, are proved to belong to a very ancient time, by the remains of the quadrupeds, birds, and fish, which served as the food of these rude hunters and fishers; among these are bones of the wild bull, beaver, seal, and great auk, all now extinct or rare in this region. Moreover, a striking proof of the antiquity of these shell-heaps is, that the shells of the common oyster are found of full size, whereas it cannot live at present in the brackish waters of the Baltic except near its entrance, so that it is inferred that the shores where the oyster at that time flourished were open to the salt sea. Thus, also, the eatable cockle, mussel, and periwinkle abounding in the kitchen middens are of full ocean size, whereas those now living in the adjoining waters are dwarfed to a third of their natural size by the want of saltness. It thus appears that the connection between the ocean and the Baltic has notably changed since the time of these rude stone-age people. (See the reports by Forchhammer, Steenstrup, and Worsaae on the kjökkenmöddings, made to the Copenhagen Academy of Sciences.) Various other evidence is adduced in this part of the argument,

such as that from the Danish peat-mosses, which show the existence of man at a time when the Scotch fir was abundant; at a later period the firs were succeeded by oaks, which have again been almost superseded by beeches, a succession of changes which indicate a considerable lapse of time. For further references to special accounts, the reader may consult the already mentioned general works on the antiquity of prehistoric man.

Lastly, chronicles and documentary records, taken in connection with archæological relics of the historical period, carry back into distant ages the starting-point of actual history, behind which lies the evidently vast period only known by inferences from the relations of languages and the stages of development of civilization. Thus, Egypt affords some basis for estimating a minimum date for its ancient population. The hieroglyphic inscriptions, the most ancient written records of the world, preserve direct memorials of a time which can hardly be less, and may be much more, than 3000 years before the Christian era. With all the doubt which besets the attempt to extract a definite chronology from the Egyptian names of kings and lists of dynasties (see EGYPT), their salient points fit with the historical records of other nations. Thus, the great Ramesside dynasty, known among Egyptologists as the 19th dynasty, corresponds with the mention of the building of the city of Raamses in Exod. i. 11; Amenophis III., called by the Greeks Memnon, belongs to the previous 18th dynasty; while the three pyramid kings, whom Herodotus mentions as Cheops, Chephren, and Mykerinos, and whose actual Egyptian names are read in the hieroglyphic lists as Chufu, Chafra, and Menkaura, are set down in the 4th dynasty. Lepsius may not be over-estimating when he dates this dynasty back as far as 3124 B.C., and carries the more dubious previous dynasties back to 3892 B.C. before reaching what are known as the mythical dynasties, which probably have their bases rather in astronomical calculations than in history (Lepsius, *Königsbuch der alten Ægypter*, Berlin, 1858; compare the computations of Brugsch, Bunsen, Hincks, Wilkinson, etc.).

The Greeks of the classic period could discuss the Egyptian chronol ogies with priests and scribes who perpetuated the languages and records of their earliest dynasties; and as the Septuagint translation of the Bible was made at Alexandria, it is not impossible that its giving to man a considerably greater antiquity than that of the Hebrew text may have been due to the influence of the Egyptian chronology. Even if the lowest admissible calculations be taken, this will not invalidate the main fact, that above 4000 years ago the Egyptian nation already stood at a high level of industrial and social culture. The records of several other nations show that as early or not much later than this they had attained to a national civilization. The Bible, whose earliest books are among the earliest existing chronicles, shows an Israelite nation existing in a state of patriarchal civilization previous to the already mentioned time of contact with Egypt. In ancient Chaldæa, the inscribed bricks of Urukh's temples probably belong to a date beyond 2000 years B.C. (G. Rawlinson, *Five Great Monarchies of the Ancient Eastern World*, London, 1862, etc., vol. i. ch. 8).

The Chinese dynasties, like those of Egypt, begin with an obviously mythical portion, and continue into actual history; the difficulty is to draw the line where genuine record begins. Those who reckon authentic history only from the dynasty of Chow, beginning about 1100 B.C., during which Confucius lived, will at any rate hardly deny the existence of the earlier dynasty of Shang, previous to which the yet earlier dynasty of Hea is recorded; so that, though much that is related of these periods may be fabulous, it seems certain that

there was a Chinese nation and a Chinese civilization reaching back beyond 2000 B.C. (see Sir John Davis, *The Chinese;* Pauthier, *Livres Sacrés de l'Orient;* Shu-King, etc.)

Till of late it was a commonly received opinion that the early state of society was one of comparatively high culture, and those who held this opinion felt no difficulty in assigning the origin of man to a time but little beyond the range of historical records and monuments. At present, however, the view has become paramount that the civilization of the world has been gradually developed from an original stone-age culture, such as characterizes modern savage life. To hold this opinion necessitates the adding to the 4000 or 5000 years to which the ancient civilizations of Egypt, Babylon, and China date back, a probably much greater length of time, during which the knowledge, arts, and institutions of these countries attained to their remarkably high level. The evidence of comparative philology corroborates this judgment. Thus, Hebrew and Arabic are closely related languages, neither of them the original of the other, but both sprung from some parent language more ancient than either. When, therefore, the Hebrew records have carried back to the most ancient admissible date the existence of the Hebrew language, this date must have been long preceded by that of the extinct parent language of the whole Semitic family; while this again was no doubt the descendant of languages slowly shaping themselves through ages into this peculiar type. Yet more striking is the evidence of the Aryan or Indo-European family of languages. The Hindus, Medes, Persians, Greeks, Romans, Germans, Kelts, and Slaves make their appearance at more or less remote dates as nations separate in language as in history. Nevertheless, it is now acknowledged that at some far remoter time, before these nations were divided from the parent stock, and distributed over Asia and Europe by the Aryan dispersion, a single barbaric people stood as physical and political representative of the nascent Aryan race, speaking a now extinct Aryan language, from which, by a series of modifications not to be estimated as possible within many thousands of years, there arose languages which have been mutually unintelligible since the dawn of history, and between which it was only possible for an age of advanced philology to trace the fundamental relationship.

From the combination of these considerations, it will be seen that the farthest date to which documentary record extends, is now generally regarded by anthropologists as but the earliest distinctly visible point of the historic period, beyond which stretches back a vast indefinite series of prehistoric ages.

VI. LANGUAGE.

In examining how the science of language bears on the general problems of anthropology, it is not necessary to discuss at length the critical questions which arise. Philology is especially appealed to by anthropologists as contributing to the following lines of argument. A primary mental similarity of all branches of the human race is evidenced by their common faculty of speech, while at the same time secondary diversities of race-character and history are marked by difference of grammatical structure and of vocabularies. The existence of groups or families of allied languages, each group being evidently descended from a single language, affords one of the principal aids in classifying nations and races. The adoption by one language of words originally belonging to another, proving as it does the fact of intercourse between two races, and even to some extent indicating the results of such intercourse, affords a valuable clue through obscure regions of the history of civilization.

Communication by gesture-signs,

between persons unable to converse in vocal language, is an effective system of expression common to all mankind. Thus, the signs used to ask a deaf and dumb child about his meals and lessons, or to communicate with a savage met in the desert about game or enemies, belong to codes of gesture-signa s identical in principle, and to a great extent independent both of nationality and education; there is even a natural syntax, or order of succession, in such gesture-signs. To these gestures let there be added the use of the interjectional cries, such as *oh! ugh! hey!* and imitative sounds to represent the cat's *mew*, the *click* of a trigger, the *clap* or *thud* of a blow, etc. The total result of this combination of gesture and significant sound will be a general system of expression, imperfect but serviceable, and naturally intelligible to all mankind without distinction of race. Nor is such a system of communication only theoretically conceivable; it is, and always has been, in practical operation between people ignorant of one another's language, and as such is largely used in the intercourse of savage tribes. It is true that to some extent these means of utterance are common to the lower animals, the power of expressing emotion by cries and tones extending far down in the scale of animal life, while rudimentary gesture-signs are made by various mammals and birds. Still, the lower animals make no approach to the human system of natural utterance by gesture-signs and emotional-imitative sounds, while the practical identity of this human system among races physically so unlike as the Englishman and the native of the Australian bush, indicates extreme closeness of mental similarity throughout the human species.

When, however, the Englishman and the Australian speak each in his native tongue, only such words as belong to the interjectional and imitative classes will be naturally intelligible, and as it were instinctive to both. Thus the savage, uttering the sound *waow!* as an explanation of surprise and warning, might be answered by the white man with the not less evidently significant *sh!* of silence, and the two speakers would be on common ground when the native indicated by the name *bwirri* his cudgel, flung *whirring* through the air at a flock of birds, or when the native described as a *jakkal-yakkal* the bird called by the foreigner a *cockatoo*. With these, and other very limited classes of natural words, however, resemblance in vocabulary practically ceases. The Australian and English languages each consist mainly of a series of words having no apparent connection with the ideas they signify, and differing utterly; of course, accidental coincidences and borrowed words must be excluded from such comparisons. It would be easy to enumerate other languages of the world, such as Basque, Turkish, Hebrew, Malay, Mexican, all devoid of traceable resemblance to Australian and English, and to one another. There is, moreover, extreme difference in the grammatical structure both of words and sentences in various languages. The question then arises, how far the employment of different vocabularies, and that to a great extent on different grammatical principles, is compatible with similarity of the speaker's minds, or how far does diversity of speech indicate diversity of mental nature? The obvious answer is, that the power of using words as signs to express thoughts with which their sound does not directly connect them, in fact as arbitrary symbols, is the highest grade of the special human faculty in language, the presence of which binds together all races of mankind in substantial mental unity. The measure of this unity is, that any child of any race can be brought up to speak the language of any other race.

To ascertain the causes to which languages owe their unlikeness in material and structure, how far to essential differences of mental type among the races of mankind, and

how far to minor causes of variation, which may be called secondary, is a problem of extreme difficulty, toward the precise solution of which little has yet been done. One of the most remarkable of linguistic differences is the tendency of some languages to isolate their words, and of others to form elaborate inflections. The extremes may be seen, on the one hand, in an ordinary Chinese sentence of isolated monosyllables, such as "*yu tsze nien chiu tsin, tung chu*," etc., *i.e.*, "in this year autumn ended, winter begun," etc.; and, on the other hand, in one of the monstrous polysyllables into which the Greenlanders will agglutinate a whole phrase, *inilertorniarpatdlasarqôrpâ*, *i.e.*, "he will probably try too much to get it done soon." Among languages which form grammatical combinations or inflexions, the modes of so doing are as various as possible. Thus, in Africa, the Hottentot noun forms its plural by a suffix, as *khoi*, "man;" *khoin*, "men;" while the Zulu employs prefixes to distinguish its numbers, as *umu-ntu*, "a man;" *aba-ntu*, "men." The Dinka may supply examples of forming the plural by internal change, *ran*, "man;" *ror*, "men." Nor are the differences of syntax in different tongues less absolute. In non-inflecting languages one of the most vital points is the relative position of two nouns, of which the one stands as substantive, and the other as defining it by an attribute. This may be illustrated by English compounds, such as *work-house* and *house-work*. Here our rule is to place the attribute-noun first, while, of two neighboring languages of Asia, the Burmese and the Siamese, the one settles this question in our way, the other in exactly the opposite. The Siamese expression for sailors, *luk rua*, means "sons of the ship," just as the Burmese expression for villagers, *rwa tha*, means "children of the village;" but in the first case the construction is "sons ship," whereas in the second it is "village children." Again, for reasons not yet fully explained, some languages place the adjective before the substantive, as Chinese *pe ma*, "white horse;" while other languages reverse this construction, as Maori, *rakau roa*, "tree long" (*i.e.*, tall tree). These are but examples of possible divergences in linguistic structure, and no prudent ethnologist would assert that racial peculiarities have nothing to do with such various tendencies. At the same time, there is no proof but that they may have resulted from historical circumstances more or less independently of race. Our own Aryan family of nations and languages affords what must always be prominent evidence in this argument. It is acknowledged that Sanskrit, Russian, Greek, Latin, Welsh, English, etc., are, philologically speaking, dialects of a single Aryan speech, which no doubt at some ancient period was spoken by a single tribe or nation. Yet the languages sprung from this original Aryan tongue, by various courses of development and accretion, are mutually unintelligible. If a Greek sentence be taken at random, such as this, "Οὐ χρὴ παννύχιον εὕδειν βουληφόρον ἄνδρα," and it be translated even too verbally into English, "A counsel-bearing man ought not to sleep all night," the traces of linguistic connection between the Greek and English words (*phoros, bear; nux, night*) are hardly perceptible except to philologists. Even the essential character of the two languages is seen to be different, for the construction of the Greek sentence depends mainly on the inflections of the words, while in English such inflections are almost discarded, and their effect is produced by the syntax and the auxiliary particles. Moreover, as to some most important points of syntax, Aryan languages differ widely from one another; thus, to use a familiar instance, French and English take contradictory lines as to the relative position of the adjective and substantive, as also of the object-pronoun and verb,—"*c'est un cheval blanc, je le vois*," "it is a white horse, I see him." So Hindustani and English, though

both Aryan tongues, reverse the positions of the verb and object, as "*ghorā lāo*" ("horse bring"), *i.e.*, "bring the horse!" Thus on the whole, the endless variety in vocabulary and structure among the languages of the world affords important evidence as to the mental diversities of the nations speaking those languages. But the unity of the faculty of speech in man stands as the primary fact, while the character of the grammar and dictionary belonging to any one nation represents only a secondary fact, such as might be fairly set down as resulting from their particular stage and circumstances of linguistic development.

The principles of the development of a family of languages from a single parent tongue are laid down in special treatises on Language. It has here to be noticed that the evidence on which such linguistic groups may be treated as allied by descent is of various degrees of fullness and strength. The most perfect available case is that of the Romance languages, comprising Italian, Spanish, French, etc.; inasmuch as not only does the classic Latin remain substantially the representative of their common original, but the very stages of their development from it are preserved in documents of successive ages. Thus, in comparing the vocabularies of Italian and French, it is, in the first place, seen that they to a great extent correspond,—this correspondence extending to words which one language is least likely to borrow from another, viz., pronouns, the lower numerals, and names of the most universal and familiar objects. It is only, however, by etymological analysis that their depth of correspondence comes fully into view, it being seen that the ultimate elements or roots are largely common to the two languages, as are also the grammatical affixes by which words are formed from these roots, while general similarity of linguistic structure pervades both tongues. Such intimate correspondence could only result from derivation from a common parent language, which in this case exists in Latin. In other groups of languages the existence of the common parent may be inferred from correspondence of this highest order. Thus there must have existed, at some period, what may be called the parent Slavonic, whence descend the Russian, Polish, Bohemian, etc.; and the parent Keltic, whence descend Welsh, Gaelic, Breton, etc., while behind the various branches of the whole Aryan family are dimly to be discerned the outlines of a primitive Aryan speech. In like manner, a comparison of the Arabic, Hebrew, Syriac, etc., shows that these must be all derived from a primitive Semitic speech, containing many of the simple root forms, which still exist in its modern descendants, and being already characterized by the principle of internal inflection. Beyond the limits of these two, the most important linguistic families, various others have been satisfactorily made out, though hardly with the same completeness of proof. In the Turanian or Tatar family are included the Turkish, Mongol, Hungarian, Finnish, Ostyak, etc.; the Dravidian family takes in the Tamil, Telugu, and various other South Indian dialects; the Polynesian family comprises the languages of the higher race of the South Sea Islands; the Negro-Kafir family consists of the prefixing languages spoken by most African tribes from the equatorial regions southward; the Guarani family in South America, the Algonquin and Athapascan families in North America, and the Australian family, each includes a number of tribes ranging over a vast extent of territory, and so on. As to smaller divisions, it is common for languages to occur in groups of several connected dialects, though not forming part of one of the wider linguistic families; thus the Aztec and Nicaraguan are closely related dialects, as are the Quichua and Aymara, while what philologists describe as isolated languages, as the Basque appears to be, are rather isolated groups of dialects, with no

known analogues beyond a limited district.

If the present state of the philological classification of mankind be compared with that of half a century ago, it will be seen that much progress has been made in referring groups of languages each to a common ancestral tongue. At the same time, greater cogency of proof is now demanded in such classification. The method of comparing a short vocabulary of twenty words or so in two languages is now abandoned, for where an extensive connection really exists, this is much better proved by a systematic comparison, while a few imperfect resemblances in the two lists might be due to accident, or the adoption of words. Nothing short of a similarity in the roots or elements of two languages, as well as in their grammatical structure, too strong to be explained by any independent causes, is now admitted as valid proof of common descent. This limitation, however, by no means amounts to a denial of the possibility of such descent. Thus it is often argued, on the strength of some similarities between Hebrew and Indo-European roots, that the two so distinct Semitic and Aryan families of language are themselves sprung from some yet more remotely ancient tongue. Thus also it has been attempted to connect the Malay and Tatar groups of languages. Either or both of these opinions may be true; but the general verdict of philologists is, that they are not satisfactorily made out, and therefore cannot be recognized.

Under the present standard of evidence in comparing languages and tracing allied groups to a common origin, the crude speculations as to a single primeval language of mankind, which formerly occupied so much attention, are acknowledged to be worthless. Increased knowledge and accuracy of method have as yet only left the way open to the most widely divergent suppositions. For all that known dialects prove to the contrary, on the other hand, there may have been one primitive language, from which the descendant languages have varied so widely, that neither their words nor their formation now indicate their unity in long past ages, while, on the other hand, the primitive tongues of mankind may have been numerous, and the extreme unlikeness of such languages as Basque, Chinese, Peruvian, Hottentot, and Sanskrit, may arise from absolute independence of origin.

The language spoken by any tribe or nation is not of itself absolute evidence as to its race-affinities. This is clearly shown in extreme cases. Thus the Jews in Europe have almost lost the use of Hebrew, but speak as their vernacular the language of their adopted nation, whatever it may be; even the Jewish-German dialect, though consisting so largely of Hebrew words, is philologically German, as any sentence shows: "*Ich hab noch hojom lo geachelt*," "I have not yet eaten to-day." The mixture of the Israelites in Europe by marriage with other nations is probably much greater than is acknowledged by them; yet, on the whole, the race has been preserved with extraordinary strictness, as its physical characteristics sufficiently show. Language thus here fails conspicuously as a test of race, and even of national history. Not much less conclusive is the case of the predominantly Negro populations of the West India Islands, who, nevertheless, speak as their native tongues dialects of English or French, in which the number of intermingled native African words is very scanty: "*Dem hitti netti na ini watra bikasi dem de fisiman*," "They cast a net into the water, because they were fishermen." (Surinam Negro-Eng.) "*Bef pas ca jamain lasse poter cônes li.*" "Le bœuf n'est jamais las de porter ses cornes." (Haytian Negro-Fr.) If it be objected that the linguistic conditions of these two races are more artificial than has been usual in the history of the world, less extreme cases may be seen in countries where the ordinary results of conquest-colonization have taken place. The

Mestizos, who form so large a fraction of the population of modern Mexico, numbering several millions, afford a convenient test in this respect, inasmuch as their intermediate complexion separates them from both their ancestral races, the Spaniard, and the chocolate-brown indigenous Aztec or other Mexican. The mother-tongue of this mixed race is Spanish, with an infusion of Mexican words; and a large proportion cannot speak any native dialect. In most or all nations of mankind, crossing or intermarriage of races has thus taken place between the conquering invader and the conquered native, so that the language spoken by the nation may represent the results of conquest as much or more than of ancestry. The supersession of the Keltic Cornish by English, and of the Slavonic Old-Prussian by German, are but examples of a process which has for untold ages been supplanting native dialects, whose very names have mostly disappeared. On the other hand, the language of the warlike invader or peaceful immigrant may yield, in a few generations, to the tongue of the mass of the population, as the Northman's was replaced by French, and modern German gives way to English in the United States. Judging, then, by the extirpation and adoption of languages within the range of history, it is obvious that to classify mankind into races, Aryan, Semitic, Turanian, Polynesian, Kafir, etc., on the mere evidence of language, is an intrinsically unsound method. From the earliest times in which nations have been classified by languages, its unrestricted use has vitiated sound ethnology.

Nevertheless, under proper restrictions, speech affords information as to the affinities of races only second in value to that derived from physical characteristics. As a rule, language at least proves some proportion of ancestry. It could hardly happen that one people should come into so close a relation to another as to supplant its language, without strong intermixture of race in the next generation. This is true in the extreme case of the West Indian colored population, among whom the majority are now crossed with European blood, so that in each succeeding generation the proportion of absolutely pure Negro families becomes less. Still more fully is it true of colored races in Mexico or Brazil, whose Spanish or Portuguese language represents at least a large European element of ancestry. Thus in India many millions of people, whose blood is predominantly that of the darker indigenous race, nevertheless speak dialects of the languages of the fairer Aryans; but then they are for the most part distinctly mixed races of partly Aryan ancestry. With these facts before us, it is not difficult to determine the principles on which the ethnologist may use language as partial evidence of race. In the first place, it strengthens the evidence of bodily characters. Thus in South Africa the Zulu seems by color, features, shape of skull, etc., to be, if not an absolute Negro of a mixed and modified Negro type. This view of his origin is strengthened by the fact that the Zulu language belongs to the peculiar prefixing family which extends so widely among the Negro nations farther north. So the Hottentot language, in its evident connection with that of the Bushmen, adds its weight to the physical argument, that these two are decendants more or less mixed and varied from a single race, small, yellow, crisp-haired, and speaking an inflectional monosyllabic language, articulated with clicks. In the second place, language may prove race-connection where bodily characteristics, though they do not contradict, do not suffice. Thus, comparing the dark Andalusian with the fair Swede we ask the question, whether there is distinguishable common parentage between these two varieties of the white man? The anatomist might hesitate here. Nor, indeed, is the physical problem nearly solved, but at least a partial solution is involved

in the philologist's proof that the two peoples speak languages inherited at some remote period from a common Aryan tongue, and must therefore have had a common element in their ancestry of at least sufficient strength to carry language with it. Thus each linguistic family affords at least partial evidence of race, proving, for instance, the existence of a common ancestry of the Irishman and the Russian, of the Jew and the Maltese, of the Tahitian and the Malagasy, though in such pairs of races the actual amount of common ancestry may be less than that of the different race-elements with which it has combined.

As regards political nationality and the history of civilization, the evidence of speech is of still greater weight. In many cases of the mixture of nations the language of the dominant civilization prevails, as where Latin dialects superseded the native tongues in Western Europe, and Germanic languages encroached on Turanian in Finland, on Slavonic in Russia, and on Keltic in the Scotch Highlands. In other cases, where one nation has received elements of civilization from another, language is apt to keep record of the process by adopting foreign words and ideas together. Thus the language of the barbarian Turks has absorbed masses of Arabic, which itself had in like manner absorbed Persian, when Persia was the fountain-head of early Moslem culture. In the same manner Dravidian languages of South India have been saturated with words and phrases from Sanskrit and its related dialects, so that a page of Tamil literature is of itself the proof of a non-Ayran race having received from an Aryan race a whole system of religion, philosophy and social order. The most extreme cases of such verbal indication of foreign influence are to be found in languages of low races of America and the Pacific, which have adopted from European languages not only terms for imported arts and ideas, but names of such numerals as 6 and 7, previously expressed by more clumsy native combinations. Thus the language of any people, though less effective than was once believed as a means of determining its place in the classified order of mankind, does, to some extent, indicate its physical, and, to a still greater extent, its intellectual ancestry.

VII. DEVELOPMENT OF CIVILIZATION.

The conditions of man at the lowest and highest known levels of culture are separated by a vast interval; but this interval is so nearly filled by known intermediate stages, that the line of continuity between the lowest savagery and the highest civilization is unbroken at any critical point. The Australians and forest Indians of Brazil may be taken as the lowest modern savages whose thought and life have been investigated with any thoroughness; while other less accurately-studied tribes are in some respects inferior even to these. An examination of the details of savage life shows not only that there is an immeasurable difference between the rudest man and the highest lower animal, but also that the least cultured savages have themselves advanced far beyond the lowest intellectual and moral state at which human tribes can be conceived as capable of existing, when placed under favorable circumstances of warm climate, abundant food, and security from too severe destructive influences. In fact, the Australian or Brazilian savage has already attained to rudimentary stages in many of the characteristic functions of civilized life. His language, expressing thoughts by conventional articulate sounds, is the same in essential principle as the most cultivated philosophic dialect, only less exact and copious. His weapons, tools, and other appliances, such as the hammer, hatchet, spear, knife, awl, thread, net, canoe, etc.,

are the evident rudimentary analogues of what still remains in use among Europeans. His structures, such as the hut, fence, stockade, earthwork, etc., may be poor and clumsy, but they are of the same nature as our own. In the simple arts of broiling and roasting meat, the use of hides and furs for covering, the plaiting of mats and baskets, the devices of hunting, trapping, and fishing, the pleasure taken in personal ornament, the touches of artistic decoration on objects of daily use, the savage differs in degree but not in kind from the civilized man. The domestic and social affections, the kindly care of the young and the old, some acknowledgment of marital and parental obligation, the duty of mutual defense in the tribe, the authority of the elders, and general respect to traditional custom as the regulator of life and duty, are more or less well marked in every savage tribe which is not disorganized and falling to pieces. Lastly, there is usually to be discerned among such lower races a belief in unseen powers pervading the universe, this belief shaping itself into an animistic or spiritualistic theology, mostly resulting in some kind of worship. If, again, high savage or low barbaric types be selected, as among the North American Indians, Polynesians, and Kafirs of South Africa, the same elements of culture appear, but at a more advanced stage, namely, a more full and accurate language, more knowledge of the laws of nature, more serviceable implements, more perfect industrial processes, more definite and fixed social order and frame of government, more systematic and philosophic schemes of religion, and a more elaborate and ceremonial worship. At intervals new arts and ideas appear, such as agriculture and pasturage, the manufacture of pottery, the use of metal implements, and the device of record and communication by picture-writing. Along such stages of improvement and invention the bridge is fairly made between savage and barbaric culture; and this once attained to, the remainder of the series of stages of civilization lies within the range of common knowledge.

The teaching of history, during the three to four thousand years of which contemporary chronicles have been preserved, is that civilization is gradually developed in the course of ages by enlargement and increased precision of knowledge, invention and improvement of arts, and the progression of social and political habits and institutions toward general well-being. The conditions of such races as the older Jews, Greeks, and Germans, are known to us by ancient chronicles, and by poetry and myth even more valuable than chronicle in the details they unconsciously preserve of the state of society at the time whence they have been handed down. Starting from the recorded condition of such barbaric nations, and following the general course of culture into the modern world, all the great processes of mental and social development may be seen at work. Falling back or decay also takes place, but only to a limited extent destroys the results of growth in culture. It is thus matter of actual record, that the ancestors of civilized nations were barbaric tribes, and the inference seems reasonable that the same process of development had gone on during previous ages outside the domain of direct history, so that barbaric culture itself arose out of an earlier and ruder condition of primitive culture, more or less corresponding with the state of modern savage tribes. The failure of direct record of this passage from savagery upward to barbarism was to be expected from the circumstances of the case. No people civilized enough to preserve history could have watched the age-long process of a savage tribe developing its culture; indeed, experience shows that independent progress could hardly have taken place among an uncivilized in contact with a civilized race. Nor could a barbaric nation, though it had really and

independently risen from savagery within some few thousand years, give any valid account of this gradual advancement, for the very reason of its having taken place while the nation was yet in, or but little removed from, the savage state, one part of the very definition of which is that it has no trustworthy means of preserving the history of events even for a single century, much less for the long period required for so vast a development. This view of the low origin and progressive development of civilization was already held in ancient times, as in the well-known speculations of the Epicurean school on the condition of the earliest men, who roved like wild animals, seeking their food from the uncultured earth, till arts and social laws arose among them (Lucret., *De Rerum Nat.*, v. 923; Horat., *Sat.*, i. 3); or where the like idea has taken in China the form of ancient legend, recording the time when their nation was taught to use skins for clothing, to make fire, and to dwell in houses (Pauthier, *Livres Sacrés de l'Orient*, p. 26.) In opposition to such views of primeval rudeness, traditions of a pristine state of human excellence have long been cherished, such as the "golden age" (Hesiod., *Op. et Dies*, 108). Till of late wide acceptance has been given to arguments, partly based on theological and partly on anthropological grounds, as to man's incapability of rising from a savage state, and the consequent necessity of a supernatural bestowal of culture on the first men, from whose high level savages are supposed by advocates of this theory to have degenerated. The anthropological evidence adduced in support of this doctrine is, however, too weak for citation, and even obviously erroneous arguments have been relied on (see, for example, Archbishop Whately, *Essay on the Origin of Civilization*, and remarks on its evidence in Tylor, *Early Hist. of Man*, p. 163). It has been especially the evidence of prehistoric archæology which, within the last few years, has given to the natural development-theory of civilization a predominance hardly disputed on anthropological grounds. The stone implements, which form the staple proof of man's existence at the period of the river-drift, are of extreme rudeness as compared even with ordinary savage types, so that it is obvious that the most ancient known tribes were, as to the industrial arts, at a low savage level. The remains in the caverns justify this opinion, especially where in central France more precision is given to the idea of prehistoric life by the discovery of bone weapons for hunting and fishing, which suggest a rude condition resembling that of the Esquimaux (see the preceding section V., *Antiquity of Man*). The finding of ancient stone implements buried in the ground in almost every habitable district of the world, including the seats of the great ancient civilizations, such as Egypt, Assyria, India, China, Greece, etc., may be adduced to show that the inhabitants of these regions had at some time belonged to the stone age. This argument goes far to prove that the ancestors of all nations, high and low, were once in that uncultured condition as to knowledge, arts, and manners generally, which within our experience accompanies the use of stone implements and the want of metals. No valid refutation of this reasoning has been offered, and it is corroborated by arguments to be drawn from study of the facts of civilization, of which some will be here mentioned for their bearing on the theory of development.

History shows how development of the arts takes place by efforts of skill and insight, as where Phidias rose above the clumsier sculptors of the time before him, or where the earliest gnomon—a mere staff set up in order to have its shadow measured—passed into the graduated sun-dial; or adaptations of old contrivances produce new results, as when the ancient Pan's pipes, blown by a bellows, became the organ, when the earlier

block-printing led up to the use of movable types, and when the magnetic-needle was taken out of the mariner's compass to find a new office on the telegraph-dial; or lastly, more absolutely original inventions arise, the triumphs of the scientific imagination, such as the pendulum and the steam-engine. In the evolution of science the new knowledge ever starts from the old, whether its results be to improve, to shift, or to supersede it. The history of astronomy extends far enough back to show its barbaric stages, when the earth was regarded as a flat surface, overarched by a solid dome or firmament; and when not only was the sun considered to move round the earth, but its motions, as well as the moon's, were referred to the guidance and even the impulse of personal deities. Beginning with this first stage of the science, there lies before us the whole record of the exacter observation and closer reasoning which have gradually replaced these childlike savage conceptions by the most perfect of physical theories. Thus, again, the history of medicine shows improvement after improvement on the rude surgical appliances and the meager list of efficient drugs which the barbaric leech had at his disposal, while its theory has changed even more absolutely than its practice; for medical history begins with the ancient world holding fast to the savage doctrine that madness, epilepsy, fever, and other diseases, are caused by demons possessing the patient—a belief which is still that of half the human race, but which it has been the slow but successful task of scientific pathology to supercede in the civilized world. In like manner, the history of judicial and administrative institutions may be appealed to for illustrations of the modes in which old social formations are reshaped to meet new requirements, new regulations are made, and new officers are constituted to perform the more complex duties of modern society, while from time to time institutions of past ages, which have lost their original purpose, and become obsolete or hurtful, are swept away.

That processes of development similar to these had already been effective to raise culture from the savage to the barbaric level, two considerations especially tend to prove. First, there are numerous points in the culture even of rude races which are not explicable otherwise than on the theory of development. Thus, though difficult or superfluous arts may easily be lost, it is hard to imagine the abandonment of contrivances of practical daily utility, where little skill is required, and materials are easily accessible. Had the Australians or New Zealanders, for instance, ever possessed the potter's art, they could hardly have forgotten it. The inference that these tribes represent the stage of culture before the invention of pottery is confirmed by the absence of buried fragments of pottery in the districts they inhabit (Lubbock, in *Report of British Association*, Dundee, 1867, p. 121). The same races who were found making thread by the laborious process of twisting with the hand, would hardly have disused if they had ever possessed it, so simple a labor-saving device as the spindle, which consists merely of a small stick weighted at one end; the spindle may, accordingly, be regarded as an instrument invented somewhere between the lowest and highest savage levels (Tylor, *Early Hist. of Mankind*, p. 193). Again, many devices of civilization bear unmistakable marks of derivation from a lower source; thus the ancient Egyptian and Assyrian harps, which differ from ours in having no front pillar, appear certainly to owe this remarkable defect to having grown up through intermediate forms from the simple strung bow, the still used type of the most primitive stringed instrument (Engel, *Music of the most Ancient Nations*, pp. 17, 30.) In this way the history of numeral words furnishes actual proof of that independent intellectual prog-

ress among savage tribes which some writers have rashly denied. Such words as *hand*, *hands*, *foot*, *man*, etc., are used as numerals signifying 5, 10, 15, 20, etc., among many savage and barbaric peoples; thus Polynesian *lima*, *i.e.*, "hand," means 5; Zulu, *tatisitupa*, *i.e.*, "taking the thumb," means 6; Greenlandish, *arfersanek-pingasut*, *i.e.*, "on the other foot three," means 18; Tamanac, *tevin itoto*, *i.e.*, "one man," means 20, etc., etc. The existence of such expressions demonstrates that the people who use them had originally no spoken names for these numbers, but once merely counted them by gesture on their fingers and toes in low savage fashion, till they obtained higher numerals by the inventive process of describing in words these counting-gestures (Tylor, in *Journal Royal Inst.*, March 15, 1867; *Primitive Culture*, chap. vii.). Second, the process of "survival in culture" has caused the preservation in each stage of society of phenomena belonging to an earlier period, but kept up by force of custom into the later, thus supplying evidence of the modern condition being derived from the ancient. Thus the mitre over an English bishop's coat-of-arms is a survival which indicates him as the successor of bishops who actually wore mitres, while armorial bearings themselves, and the whole craft of heraldry, are survivals bearing record of a state of warfare and social order whence our present state was by vast modification evolved. Evidence of this class, proving the derivation of modern civilization, not only from ancient barbarism, but beyond this, from primeval savagery, is immensely plentiful, especially in rites and ceremonies, where the survival of ancient habits is peculiarly favored. Thus the modern Hindu, though using civilized means for lighting his household fire, retains the savage "fire-drill" for obtaining fire by friction of wood when what he considers pure or sacred fire has to be produced for sacrificial purposes; while in Europe into modern times the same primitive process has been kept up in producing the sacred and magical "need-fire," which was lighted to deliver cattle from a murrain. Again, the funeral offerings of food, clothing, weapons, etc., to the dead are absolutely intelligible and purposeful among savage races, who believe that the souls of the departed are ethereal beings, capable of consuming food, and of receiving and using the souls or phantoms of any objects sacrificed for their use. The primitive philosophy to which these conceptions belong has to a great degree been discredited by modern science; yet the clear survivals of such ancient and savage rites may still be seen in Europe, where the Bretons leave the remains of the All Souls' supper on the table for the ghosts of the dead kinsfolk to partake of, and Russian peasants set out cakes for the ancestral manes on the ledge which supports the holy pictures, and make dough ladders to assist the ghosts of the dead to ascend out of their graves and start on their journey for the future world; while other provision for the same spiritual journey is made when the coin is still put in the hand of the corpse at an Irish wake. In like manner magic still exists in the civilized world as a survival from the savage and barbaric times to which it originally belongs, and in which is found the natural source and proper home of utterly savage practices still carried on by ignorant peasants in our own country, such as taking omens from the cries of animals, or bewitching an enemy by sticking full of pins and hanging up to shrivel in the smoke an image or other object, that similar destruction may fall on the hated person represented by the symbol (Tylor, *Primitive Culture*, chap. i., iii., iv., xi., xii.; *Early Hist. of Man*, chap. vi.).

To conclude, the comparative science of civilization thus not only generalizes the data of history, but supplements its information by laying down the lines of development along

which the lowest prehistoric culture has gradually risen to the highest modern level. Among the most clearly marked of these lines is that which follows the succession of the stone, bronze, and iron ages. The stone age represents the early condition of mankind in general, and has remained in savage districts up to modern times, while the introduction of metals need not at once supersede the use of the old stone hatchets and arrows, which have often long continued in dwindling survival by the side of the new bronze and even iron ones. The bronze age had its most important place among ancient nations of Asia and Europe, and among them was only succeeded after many centuries by the iron age; while in other districts, such as Polynesia and Central and South Africa, and America (except Mexico and Peru), the native tribes were moved directly from the stone to the iron age without passing through the bronze age at all. Although the three divisions of savage, barbaric, and civilized man do not correspond at all perfectly with the stone, bronze, and iron ages, the classification of civilization thus introduced by Nilsson and Thomsen has proved a guide of extraordinary value in arranging in their proper order of culture the nations of the Old World. Another great line of progress has been followed by tribes passing from the primitive state of the wild hunter, fisher, and fruit-gatherer, to that of the settled tiller of the soil, for to this change of habit may be plainly in great part traced the expansion of industrial arts and the creation of higher social and political institutions. These, again, have followed their proper lines along the course of time. Among such are the immense legal development by which the primitive law of personal vengeance passed gradually away, leaving but a few surviving relics in the modern civilized world, and being replaced by the higher doctrine that crime is an offense against society, to be repressed for the public good. Another vast social change has been that from the patriarchal condition, in which the unit is the family under the despotic rule of its head, to the systems in which individuals make up a society whose government is centralized in a chief or king. In the growth of systematic civilization, the art of writing has had an influence so intense, that of all tests to distinguish the barbaric from the civilized state, none is so generally effective as this, whether they have but the failing link with the past which mere memory furnishes, or can have recourse to written records of past history and written constitutions of present order. Lastly, still following the main lines of human culture, the primitive germs of religious institutions have to be traced in the childish faith and rude rites of savage life, and thence followed in their expansion into the vast systems administered by patriarchs and priests, henceforth taking under their charge the precepts of morality and enforcing them under divine sanction, while also exercising in political life, an authority beside or above the civil law. These illustrations may suffice to make it clear that although the science of culture is still but rudimentary and imperfect, it indicates the one sound and indispensable method for the study of human arts and institutions, that of placing each at its proper stage in a line of evolution, and explaining it by the action of new conditions upon the previous stage whence it was derived.

ARCHÆOLOGY.

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THE term *Archæology*, like that of *Antiquities*, has been employed, until a very recent period, in a sense so restricted and arbitrary as strikingly to contrast with the latitude admissible according to the original derivation of the word. Literally it signifies the study of antiquity or ancient things; but its precise significance has been determined from time to time by the range of study and research most in favor. To some extent it has always been recognized as embracing whatever pertained to the early history of any nation, but in its details it was applied almost exclusively to the study of Greek and Roman art, or of classical antiquities generally. The progress of geology, and the application of sound principles of induction to the study of primitive antiquities, have wrought a great revolution, and few studies now rival archæology in comprehensive interest.

In looking at the succession of strata of the earth's crust it was assumed till recently that the student of man and his remains is limited to the latest superficial formation of post-tertiary strata. To the palæontologist was assigned all ancient animal life of the fossiliferous strata, while the archæologist treated of man and his works as things essentially distinct. The diverse functions of the two sciences are still clearly recognized; but the archæologist is no longer supposed to be excluded either from quaternary or tertiary strata in his search not only for the remains of human art, but for the osteological evidences of man's presence contemporaneous with the fauna of such geological periods. One class of archæologists, accordingly, confidently anticipate the recovery not only of works of art, but of the fossil remains of man himself, in the pliocene, or even the miocene strata. So far, however, as any reliable evidence can guide opinion, it scarcely admits of question that neither has hitherto been found in older deposits than the later tertiary, or quaternary.

The actual remains of man, the specific form of his osseous structure, and above all of his skull, now receive the minutest attention; and the department of anthropology to which such investigations are specially assigned has latterly acquired a fresh interest from the inquiries suggested by novel theories as to the possible evolution of man from lower animal organizations. Nevertheless, the researches of the palæontologist and of the archæologist are based on essentially distinct evidence. The life of geological periods is investigated by means of the fossil bones and teeth which alone survive. Or if to these have to be added such illustrations of habits, food, and structure as are furnished by means of footprints, coprolites, and the like subsidiary evidence, still all are traceable, directly or indirectly, to the living organism. Man, on the contrary, in times altogether preceding history, is chiefly studied by means of his works. Archæology thus forms the intermediate link between geology and history, though the

reaction, at the revival of learning in the 16th century, which tended for a time to subordinate arts and science alike to classical authority, reduced it within greatly narrower limits. Nevertheless, the fitness of the term for the most comprehensive definition in relation to all which pertains to the past could not be entirely overlooked, and it is even employed repeatedly by Dr. Prichard as nearly synonymous with palæontology. In this, however, he has not been followed, and the name is now universally adopted to designate the science which deduces the history of man from the relics of the past.

The innate cravings of the human mind for an insight into the future have shaped themselves into many forms of divination and astrology. But this desire is not more universal than that which prompts man to aim at a recovery of the secrets of the past. The question *Whence?* even more than that of *Whither?* is found to give shape to the mythic legends of the rude barbarian, and to constitute an important element in the poetry and mythology of every nation's oral and written history. With the progress of society such indices of the past are subjected anew to critical analyses; and we accordingly find abundant traces of an archæological spirit in the literature of every civilized nation. The influence of the same craving for a mastery of the past is seen adapting itself to the spirit of the age at every epoch of great progress. The revival of art and letters in the 14th and 15th centuries was signalized by a renewed appreciation of Greek and Roman models; and while the progress of opinion in the 16th century was accompanied by an abandonment of mediæval for classic art, the tendency of Europe in our own day, amid many elements of progress, has been singularly consentaneous in the return not merely to mediæval art, but to mediæval modes and standards of thought, and in the attempt to attain to higher excellence than has been yet achieved by a more perfect development of the ideal of the middle ages.

The alliance of archæology with geology, and the direction of geological research to the evidences of the antiquity of man, have largely contributed to its expansion, until in its comprehensive unity it embraces the entire range of human progress from the infantile stage of primeval arts to the earliest periods of written records. It has thus been developed into a systematic science, by which the intelligent investigator is enabled to pursue his researches with the aid of evidence older than all written chronicles, and to recover chapters of national infancy and youth heretofore deemed beyond recall. The geologist, with no aid from written records, follows out his inquiries through successive periods of the earth's history, and reveals the changes it has undergone, and the character of the living beings which animated epochs of the globe ages before man was called into being. Beginning with the traces of life in the primary fossiliferous strata, he passes on from system to system, disclosing a vast succession of long extinct life, until in the latest diluvial formations he points to the remains of animals identical with existing species, and even to traces of human art—the evidence of the close of geological and the beginning of archæological periods. Here archælogical science ought to be ready to take up the narrative, and with a more comprehensive minuteness of detail and greater certainty as to the conclusions arrived at. Such, however, until very recently, has not been the case. The geologist himself long confused the records of the transitional period by his mistaken reference of all diluvial traces to the Noachian deluge; and when, pausing, as he thus believed, at the dawn of the historic period, he turned to the archæologist for the subsequent chapters of the history of life on our globe, it was only to receive a record of Roman traces at best but meagerly supplementing the minuter details of the historian. Nearly the

same was the case with all historic antiquity, with the single exception of the wonderful monuments of Egypt, which preserve to us the records of a civilization in which we can recognize the origin of arts, letters, and all else to which the culture of the oldest historical nations may be traced.

Nevertheless, the evidences of the primitive arts, and the traces of a native civilization originating among the prehistoric races of Europe, had been long familiar to the antiquary, though he failed to form any intelligent conception of their significance as historical records. Their interpretation on an intelligent and systematic principle is mainly due to the archæologists and ethnologists of Denmark and Sweden, who from their very geographical position were happily freed from the confusing element of classical prejudices, and were compelled to seek in other than Roman sources an origin for the abundant traces of metallurgic art. Zealous British coadjutors speedily caught the hint, and freed themselves from the trammels which had so long narrowed their aim; the remains of primitive art were referred to true sources, or at least arranged under an intelligent system of chronological sequence; and thus the desultory and ofted misdirected labors of the antiquary have given place to researches characterized by scientific accuracy.

The system of primitive archæology thus introduced has since been modified and carried out into ampler details, as the fruit of more extended discoveries, chiefly effected in France and England; but the three primary divisions, the Stone, the Bronze, and the Iron Periods, are still retained. The arrangement is warranted alike by evidence and by its practical convenience, though later research has given to the stone period a comprehensiveness undreamt of before, and so led to its subdivision into two ages of prolonged duration, with distinctive characteristics of primitive art. (1.) The Stone Period, as the name implies, is that in which the rude aboriginal arts, which the commonest necessities of man call into operation, are assumed to have been employed entirely on such available materials as stone, horn, bone, etc. (2.) The Bronze Period may in like manner admit of subdivision, though the term is conveniently employed, in its most comprehensive sense, for that era of progress in which the metallurgic arts appear to have been introduced and slowly developed—first, by the simple use of native copper, followed by the application of fire, the construction of molds, and the discovery of such chemical processes as the alloying of copper and tin, and the consequent production of the beautiful and useful alloy which gives name to this the earlier metallurgic era. (3.) The Iron Period marks the era of matured metallurgic arts, and the accompanying progress consequent on the degree of civilization which is the inevitable concomitant of such a state of things. While, however, those divisions hold good in their general application, they must not in every case be applied too rigidly. The archæologist is constantly recalled to the distinction between the researches of the palæontologist, as dealing with the traces of organic life, and his own study of the works of a rational being marked by all the diversities traceable to the reasoning and volition of the individual workman. Local facilities have also modified the arts of primitive man in various ways. In some localities, as in North America, pure native copper abounds; while on the other hand, in certain districts of Africa iron occurs in such a condition that it appears to have been wrought by the primitive metallurgist from very remote times.

All those periods embrace eras concerning which no contemporary written records exist; and in relation to most of them nearly as little is known directly as of the older periods with which the geologist exclusively deals. It need not therefore excite surprise that the process of induction established on this basis has been chal-

lenged by historical writers of high standing, but whose exclusive labors on the records of periods admitting of documentary evidence and charter proof render them little disposed to sympathize with a course of reasoning relative to the history of man, such as has, in the hands of the geologist, revealed so much in relation to more ancient life. The further, however, that research is pursued, alike into the habits of living races of savages, and into the characteristics of the oldest traces of primitive art, the more clearly does such a process of development, from the first rude working in stone to the highest arts of the skilled metallurgist, become manifest.

The Australians, the Maories of New Zealand, and the whole widely-scattered races of the Polynesian Islands, the Caribs and other natives of the American archipelago, with all the nomade tribes of the New World, from Patagonia to the Arctic circle, were, when first discovered, without any knowledge of the metals as such, and supplied their wants by means of implements and weapons of stone, shell, bone, or wood. The civilized Mexicans and Peruvians, on the contrary, when first visited by the Spaniards in the 16th century, were familiar with the working of copper as well as gold,—though totally ignorant of iron, and also retaining for common purposes many of the primitive stone weapons and implements, only substituting the abundant obsidian of their volcanic region for flint. Greece passed from its bronze to its iron age within the period embraced in its literary history; and the mastery of the art of working the intractable iron ore is traceable with tolerable clearness in the early history of Rome, not very long before it came in contact with the trans-Alpine barbarians. Among most of the Germanic and Celtic tribes iron appears to have been already known when they first came in contact with the aggressive civilization of the south; and from one of them, the Norici (in whose country, in the Austrian valleys of the Danube, this metal is still wrought with the highest skill,) there is reason to believe that the Romans acquired the art of making steel.

If history is only to begin, as that of Britain has been made to do, with the date of the first collision with invading Rome, then, no doubt, stone and bronze periods are as meaningless as are eocene and miocene periods to the geologist who assigns the Mosaic deluge as the source of the earliest phenomena of his science. To those, however, who are willing to follow inductive reasoning to its legitimate conclusions it must be apparent that it is no visionary theory, but a system founded in well-established truth, which arranges the archæological records of primitive history and the remains of human art into stone, bronze, and iron periods. Even here, however, an important distinction in the employment of such materials as a basis of inductive reasoning indicates the greatness of the revolution involved in the introduction among the living creatures inhabiting this earth of a being endowed with intelligence, and supplementing the natural resources of animal life by arts even of the most primitive kind. It must indeed be born in remembrance that geological and historical chronology are very different things, and that the idea implied in the contemporaneousness of strata bears a very slight approximation to the coincidence of contemporaneous events and productions of an historical era. The doctrine of geological continuity is indeed challenged in certain respects; but on the whole, the geological formations, with their included organic remains, may be assumed to obey a natural and unvarying order; and so, within the compass of geological periods, to be of contemporaneous origin. But, notwithstanding certain extreme assumptions, based on the theory of evolution, and involving the consequent existence of man in remote geological eras, so far as all actual evidence can yet guide us, it is correct to say that,

geologically speaking, the entire history of man is embraced in one period. But in the works of art, which form the bases of archæological induction, a new element—that of mind, or the reasoning faculty, along with the imitative and social arts—is introduced, and greatly complicates its subdivisions. The stone period of Britain or Denmark is analogous to that of the Polynesian Islands. So closely do their tools and weapons resemble each other that it requires a practiced eye to distinguish the stone axe or flint lance-head found in an ancient British barrow from implements brought by some recent voyager from the islands of the Southern Ocean. Nor could the most experienced archæologist undertake in every case to discriminate between the flint arrow-head dug from some primitive barrow of undated centuries before the Christian era, and the corresponding weapon brought by some recent traveler from Tierra del Fuego or regions beyond the Rocky Mountains. The inference is therefore legitimate, that in those Polynesians, Fuegians, or Indians of the North-West, we have examples of tribes in the same primitive stage as were the aborigines of Europe during its stone period. Chronologically, however, the stone period of Europe and that of the Pacific islands or the American continent are separated by thousands of years. In like manner, the bronze age of Mexico was undisturbed by all later elements when first brought into contact with the matured civilization of Europe in the 16th century, while the close of that of Britain preceded the 1st century of our era. The same rule is applicable to the primitive archæology of all countries; and a fertile source of error and misconception has already had its rise in the assumption that because Greece and Italy, Germany, Gaul, Scandinavia, and Britain, have all had their primitive stone and bronze periods, therefore the whole must have been contemporaneous. It cannot therefore be too strongly enforced as one of the most essential points of variance in the reasoning of the geologist and the archæologist, that the periods of the latter, though synonymous, are not necessarily synchronous; but that, on the contrary, nearly all the phenomena which pertain to the *natural history* of man, and to the historic development of the race, may be witnessed in their various stages in contemporary races of our own day—from rudimentary barbarism, and the absence of all arts essential to the first dawn of civilization to a state of greatest advancement in the knowledge and employment of such arts.

Some progress has already been made in an approximation to certain chronological data of much importance relative to such primitive periods of the history of nations. But the archæologist, as well as the geologist, is learning to deal with periods of time which cannot always be measured either by years or centuries, but rather must be gauged by those chronological stages in the history of our planet in which epochs and periods take the place of definite subdivisions of solar time. Nevertheless, geological evidence of changes which are known to have occurred within the historic period supplies an important key to the approximate duration of certain eras characterized by traces of human art; and while by the intelligent observation of such remains in the superficial strata, mingling with the fossil evidences of extinct and familiar species of animal life, the link is supplied by which man takes his place in an unbroken chain of creative existence, sweeping back into so remote a past, the evidences of matured art pertaining to periods unrecorded by history supply later links of the same chain, and reunite the present with all former ages.

The system of primitive archæology which is found applicable to British antiquities so closely corresponds in all its essential features to that of Europe prior to the era of authentic history, that the purpose of such an

abstract as this will be most conveniently accomplished by presenting its leading points as examples of the whole, illustrating these in passing by the analogous remains discovered in other countries. The apparent simplicity of a primitive stone period has been considerably modified by recent research; and the careful study of the remains of ancient art, in their relation to accompanying geological phenomena, or of the evidences of artificial deposition in caves, barrows, chambered cromlechs, cairns, or other sepulchral structures, suggests the subdivision of prehistoric archæology into a succession of epochs included within the period of nonmetallurgic arts.

But before defining the archæological subdivisions of time it is indispensable to glance at the palæontological elements of the question, and the evidences they supply in relation to comparative chronology. One of the most remarkable phenomena affecting the conditions of life in Europe in recent geological epochs is the existence of a period, of long duration throughout the northern hemisphere, of a temperature resembling that of the Arctic regions at the present time. After a period more nearly approximating in its conditions the heat of the tropics at the present day, though otherwise under varying states toward the end of the tertiary epoch the temperature of the whole northern hemisphere gradually diminished, until the mountainous regions of Scotland and Wales—then probably of a much higher elevation—resembled Greenland at the present time; and this Arctic temperature gradually extended southward to the Alps and the Pyrenees. The glaciers formed under the influence of perpetual frost and snow descended from those and other mountains into the valleys and plains over the greater portion of central Europe and northern Asia; and this condition of things, pertaining to what is known as the *glacial period*, was one of greatly prolonged duration.

After some partial modifications of this low temperature, and a consequent advance and retrocession of the glacial influences in France and elsewhere, along what was then the border lines of a north temperate zone, the glacial period drew to a close; a gradual but persistent rise of temperature carried the lines of ice and perpetual snow further and further northward, excepting in regions of great elevation, as in the Swiss Alps. This was necessarily accompanied by the melting of the vast glaciers accumulated in the mountain valleys throughout the protracted period of cold. The broken rocks and soil of the highlands were swept into the valleys by torrents of melted ice and snow; the lower valleys were hollowed out and re-formed under this novel agent; and the landscape received its present outlines of valley, estuary, and riverbeds from the changes wrought in this *diluvian epoch*. The enormous power of the torrents thus acting continuously throughout a period of prolonged duration, and the vast deposits of sand, gravel, and clay, with the embedded remains of contemporaneous animal and vegetable life with which they everywhere covered the plains, were viewed till recently solely in relation to the Mosaic narrative of a universal deluge, and were referred implicitly to that source. But recent though the epoch is when compared with older geological periods, its antiquity is enormous in relation to historic chronology; and instead of being the product of a sudden cataclysm of brief duration, it represents phenomena which required a period of long protracted centuries for their evolution.

Within this late tertiary, or quaternary, period are found the remains of animal life contemporary with primeval man and his earliest arts. The very characteristics of some of the fossil mammals of the period, so diverse from all that we have been accustomed to associate with man, help to suggest ideas of even an exaggerated antiquity for the era to which

they are assignable, and to relegate it to the remotest conceivable antiquity consistent with all other evidence of the oldest traces of man or his arts seemingly contemporaneous with them. Of those now wholly extinct, the mammoth or *Elephas primigenius*, the *Elephas antiquus*, the *Rhinoceros tichorinus*, the *Hippopotamus major*, and such great cave carnivora as the *Ursus spelæus* and the *Felis spelæa*, are most noticeable for their great size, and in some cases for their enormous destructive powers, in striking contrast to the seemingly helpless condition of primitive man. Yet even some of those formidable mammalia probably owed their extinction fully as much to the presence of man as to any change in temperature and consequent alteration in the required conditions of climate and habitat. We are accustomed to regard the lion, tiger, leopard, panther, and others of the great *Felidæ* as pertaining exclusively to tropical countries. They are in reality limited to tropical jungles and uncultivated regions of great extent, where the abundance of wild vegetable-feeding animals supplies their food. The existence of neither is compatible with the presence of man in any great numbers; but in his absence those beasts of prey greatly extend their range. The Indian tiger not only follows the antelope and deer in the Himalayan chain to the verge of perpetual snow, but the tiger, leopard, panther, and cheetah hunt their prey beyond that mountain range, even into Siberia.

The influence of man in the extirpation of the wild fauna is illustrated by another class of extinct animals of many historical regions, which yet survive in more favorable localities. The discovery of abundant evidence of a period in the history of central and southern France when the reindeer (*Cervus tarandus*) formed one of the chief sources both for the food of man and for the materials from which his weapons and implements were made, seems to carry us back to an era inconceivably remote, when central France was in the condition of Lapland in mediæval or still earlier centuries. But the climate of North Britain is not even now incompatible with the existence of the reindeer, and its favorite moss abounds in many parts of the Highlands. It need not therefore surprise us to learn that traces of the reindeer are by no means rare in Scotland; and numerous examples of its horns have recently been recovered in more than one Caithness locality, with the marks of sawing and cutting for artificial use, and lying among other remains in stone-built structures of a primitive population of North Britain. How old they are may not be strictly determinable, but they help us to the acceptance of a very modern date for the presence of the reindeer there; for Torfæus states that so recently as the twelfth century the Jarls of Orkney were wont to cross the Pentland Firth to chase the roe and the reindeer in the wilds of Caithness. At the same date also we find the skin of the beaver rated for customs duties amongst articles of Scottish export specified in an Act of the reign of David I.

Another very characteristic animal pertaining to the prehistoric era of European man is the *Megaceros Hibernicus*, or gigantic Irish elk. Its bones occurred with those of the *Elephas primigenius*, the *Rhinoceros tichorinus*, the *Ursus spelæus*, and other extinct mammals, alongside of human remains and works of art, in the famous Aurignac cave of the Pyrenees; and in the recently-explored Brixham cave, on the Devonshire coast, similar remains of the fossil rhinoceros, horse, and reindeer, as well as of several extinct carnivora, lay embedded in the same breccia with flint knives. And not only have the horns and bones of the *Megaceros Hibernicus* been recovered from Irish bogs and marl-pits, with marks of artificial cutting, but a rude Irish lyre, found in the moat of Desmond Castle, Adare, has been pronounced by Professor Owen to be made from the bone of this extinct deer.

So is it with the ancient *Bovidæ*, not only adapted for the chase, but suitable for domestication; such as the *Bos primigenius*, the *Bos longifrons*, and the *Bison priscus*. Their remains have been found in submarine forests, or mingling in the drift or cave deposits with the *Elephas primigenius*, the *Felis spelæa*, and others of the most gigantic fossil mammals; while abundant traces reveal their existence not merely contemporaneous with man, but within definite historical periods.

The great alluvial valley of the river Forth has yielded another class of relics connecting the gigantic fossil mammalia of a prehistoric epoch with man. The disclosures of the Carse of Falkirk have repeatedly included remains of the *Elephas primigenius*: and in at least one case its tusks were found in such perfect condition as to be available for the ivory-turner, though lying embedded at a depth of 20 feet in the boulder clay. But in the neighboring valley of the Forth the fossil whale (*Balænoptera*) has not only been repeatedly found far inland, buried in the alluvial soil, at levels varying from 20 to 25 feet above high-water mark, but in at least two instances the rude lance or harpoon of deer's horn lay alongside of the skeletons; and near another of them were found pieces of stag's horn, artificially cut, and one of them perforated with a hole about an inch in diameter. Flint implements, an oaken quern, and other ingenious traces of primitive art, recovered from the same alluvial soil, all tell of a time when the British savage hunted the whale in the shallows of a tide at the base of the Ochil hills, now between 20 and 30 feet above the highest tides and 7 miles distant from the sea.

There is no doubt that the disappearance of the whale from the British shores, like the reindeer from its northern valleys, is due far more to the presence of man than to any change of temperature so greatly affecting the conditions of life as to involve their extinction. Nevertheless it is convenient to recognize in the disappearance of such emigrant species from the historic areas the close of the palæontological age. The Urus, the Aurochs, the *Bos longifrons*, or native ox of the Roman period, and others of that important class of animals which man first began to turn to account for domestication, have also ceased to exist among European fauna; but this is clearly traceable to the destructive presence of man. Within three or four centuries the Urus (*Bos primigenius*) was still known in Germany; the Aurochs (*Bos priscus*) is even now preserved under special protection in Lithuania; and herds of British wild cattle in Cadzow forest, Lanarkshire, and at Chillingham Park, Northumberland, perpetuate varieties otherwise extinct.

Reverting, then, to the classification which prehistoric archæology admits of, in the light of its most recent disclosures, it appears to be divisible into four distinct epochs, of which the first two embrace successive stages of the age of stone implements.

1. The *Palæolithic Period* is that which has also been designated the Drift Period. The troglodytes, or cave-dwellers, of this primitive era were to all appearance contemporaneous with the mammoth, the woolly-haired rhinoceros, and the great cave carnivora already named. In England, France, Belgium, and other countries of Europe, numerous caves have been explored which were undoubtedly the habitations and workshops of the men of this period. These caverns vary in character and dimensions according to the geological features of the localities where they occur; but all alike involve the simple feature of recesses, more or less ample, affording comparatively dry and commodious shelter, and so being resorted to as places of habitation alike by wild animals and by man himself. But the most valuable for the purposes of the archæologist are a class of caverns which occur in limestone districts, and which, from the combined mechanical action of

the water operating on a rock easily eroded, and its chemical action when charged with a certain amount of carbonic acid in dissolving the calcareous rock, are found expanded into long galleries and chambers of large dimensions. There the same chemical agents, acting under other circumstances, have dissolved the limestone rock, and sealed up the ancient flooring at successive intervals, thereby furnishing a test of the duration of long periods of alternate action and repose, and yielding evidence of the most indisputable kind as to the order of succession of the various deposits and their included bones and implements.

In Belgium, at Dordogne, and in some parts of the south of France, the caves and rock-recesses are of a much simpler character. Yet there also favoring circumstances have preserved contemporary deposits of the ancient cave-dwellers, their works of art, the remains of their food, and even their cooking hearths.

The caves of the drift period accordingly present peculiarly favorable conditions for the study of the post-pliocene period. Some of these caverns were evidently first occupied by the extinct carnivora of that period, as in the case of the famous Kent's Hole Cave of Devonshire, of which the lowest deposit is a breccia of water-worn rock and red clay, interspersed with numerous bones of the *Ursus spelæus*, or great cave-bear. Over this a stalagmitic flooring had been formed, in some places to a depth of several feet, by the long-protracted deposition of carbonate of lime held in solution in the drippings from the roof. Above this ancient flooring, itself a work of centuries, later floods had superimposed a thick layer of "cave-earth," in some cases even entirely filling up extensive galleries with a deposit of drift-mud and stones, within which are embedded the evidences of contemporaneous life—bones and teeth of the fossil elephant, rhinoceros, horse, cave-bear, hyæna, reindeer, and Irish elk; and along with these, numerous weapons and implements of chipped flint, horn, and bone—the unmistakable proofs of the presence of man. These, again, have been sealed down, in another prolonged period of rest, by a new flooring of stalagmite; and thus the peculiar circumstances of those cave deposits render them specially favorable for the preservation of a coherent record of the period. Here are the evidences of the animal life contemporaneous with the men of the caves during the drift period; here also are many of their smaller flint implements—the flint-cores and the chips and flint-flakes, showing where their actual manufacture was carried on; and the lances, bodkins, and needles of bone, which could only have been preserved under such favoring circumstances.

But besides the actual deposits in the caves, the river gravels of the same period have their distinct disclosures. The spear-heads, discs, scrapers, and other large implements of chipped flint are of rare occurrence in the cave breccia. Their size was sufficient to prevent their being readily dropt and buried beyond reach of recovery in the muddy flooring of the old cave dwelling; and the same cause preserved them from destruction when exposed to the violence involved in the accumulation of the old river drifts. In the north of France, and in England from Bedfordshire southward to the English Channel, in beds of ancient gravel, sand, and clay of the river valleys, numerous discoveries of large flint implements have been made—from the year 1797, when the first noted flint implements of the drift were discovered in the same stratified gravel of Hoxne, in Suffolk, in which lay bones of the fossil elephants and other extinct mammalia. The characteristics of the river-drift implements, as well as of the whole art of the stone age, have been minutely described and illustrated in various works, but especially in Evans's *Ancient Stone Implements, Weapons, and*

Ornaments of Great Britain. It is sufficient, therefore, to refer to such authorities for details.

But besides the numerous specimens of the manufactures in flint, horn, and bone, illustrative of the mechanical ingenuity of this primitive era, special attention is due to the actual evidences of imitative and artistic skill of the sculptors and draughtsmen of the same period.

Different attempts have been made, especially by French *savans*, to subdivide the palæontologic age of man into a succession of periods, based chiefly on the character of the mammalian remains accompanying primitive works of art; and the two great subdivisions of the elephantine or mammoth age and the reindeer age have been specially favored. Among the works of art of the cave-men of Perigord, in central France, contemporary with the reindeer, various drawings of animals, including the reindeer itself, have been found incised on bone and stone, apparently with a pointed implement of flint. But the most remarkable of all is the portrait of a mammoth, seemingly executed from the life, outlined on a plate of ivory found in the Madelaine Cave, on the river Vezère, by M. Lartet, when in company with M. Verneuil and Dr. Falconer. If genuine—and the circumstances of the discovery, no less than the character of the explorers, seem to place it above suspicion—this most ancient work of art is of extreme value. The skulls and other remains of five individuals have been found to illustrate the men of this period. The cerebral development is good, and alike in features and form of head they compare favorably with later savage races. Their drawings embrace animals, single and in groups, including the mammoth, reindeer, horse, ox, fish of different kinds, flowers, ornamental patterns, and also ruder attempts at the human form. They also carved in bone and ivory. Some of the delineations are as rude as any recent specimens of savage art, others exhibit considerable skill; but the most remarkable of all is the representation of the mammoth. It has been repeatedly engraved, and as, to all appearance, a genuine contemporary effort at the portraiture of that remarkable animal, its worth is considerable. But this sinks into insignificance in comparison with its value as a gauge of the intellectual capacity of the men of that remote age. It represents the extinct elephant, sketched with great freedom of hand, and with an artistic boldness in striking contrast to the labored efforts of an untutored draughtsman. Whatever other inference be deduced from it, this is obvious, that in intellectual aptitude the palæolithic men of the reindeer period of central France were in no degree inferior to the average Frenchman of the 19th century.

2. This first, or palæolithic period, with its characteristic implements of chipped flint, belonging to an epoch in which man occupied central Europe contemporaneously with the mammoth, the cave-bear, and other long-extinct mammals, was followed by the second or *Neolithic Period*, or, as it has been sometimes called, the Surface-Stone Period, in contradiction to the Drift Period, characterized by weapons of polished flint and stone. The discovery and exploration of the ancient *Pfahlbauten* or lake villages of Switzerland and other countries, including the crannoges of Ireland and Scotland, and of the *kjökken-möddings* or refuse-heaps of Denmark, Scotland, and elsewhere, have greatly extended the illustrations of this period, and given definiteness to the evidences of its antiquity. But while it thus includes works of a very remote epoch, it also embraces those of later regular sepulture, with the sepulchral pottery of rudest type, the personal ornaments and other remains of the prehistoric races of Europe, onward to the dawn of history. It even includes the first traces of the use of the metals, in the employment of gold for personal adornment, though with no intelligent

recognition of its distinction from the flint and stone in which the workmen of this neolithic period chiefly wrought.

The nearly indestructible nature of the materials in which the manufacturers alike of the palæolithic and the neolithic period chiefly wrought, helps to account for the immense number of weapons and implements of the two prolonged ages of stone-working which have been recovered. The specimens now accumulated in the famous collection of the Christiansborg Palace at Copenhagen amount to several thousands. The Royal Irish Academy, the Society of Antiquaries of Scotland, the British Museum, and other collections, in like manner include many hundreds of specimens, ranging from the remotest periods of the cave and drift men of western Europe to the dawn of definite history within the same European area. They include hatchets, adzes, gouges, chisels, scrapers, disks, and other tools in considerable variety; axes, lances, spear and arrow heads, mauls, hammers, and other weapons and implements of war and the chase; besides a variety of utensils, implements, and ornaments, with regard to which we can but vaguely guess the design of their construction. Many of these are merely chipped into shape, sometimes with much ingenuity, in other cases as rudely as the most barbarous and massive implements of the palæolithic period. But from their association, in graves or other clearly-recognized deposits of the later period, with ground and polished implements, and even occasionally with the first traces of a time when the metals were coming into use, there is no room to question their later origin. In part they may be legitimately recognized, like the whole elements of archæological classification, to mark different degrees of rudeness in successive steps toward civilization; in part they indicate, as in manufactures of our own day, the economy of labor in roughly-fashioned implements designed only for the rudest work, or for missiles the use of which involved their loss.

To the same primitive period of rude savage life must be assigned the rudiments of architectural skill pertaining to the *Megalithic Age*. Everywhere we find traces, alike throughout the seats of oldest civilization and in earliest written records, including the historical books of the Old Testament Scriptures, of the erection of the simple monolith, or unhewn pillar of stone, as a record of events, a monumental memorial, or a landmark. There is the Tanist Stone, or kingly memorial, like that set up in Shechem when Abimelech was made king; the Hoar Stone, or boundary-stone, like "the stone of Bohan, the son of Reuben," and other ancient landmarks of Bible story; the Cat Stone, or battle-stone, a memorial of some great victory; and the stone set up as the evidence of some special treaty or agreement, like Laban and Jacob's pillar of witness at Galeed. To the same primitive stage of architecture belong the cromlech, the cairn, the chambered barrow, and other sepulchral structures of unhewn stone; as well as the weems, or megalithic subterranean dwellings common in Scotland and elsewhere, until, with the introduction of metals and the gradual mastery of metallurgic art, we reach the period of partially hewn and symmetrical structures, of which the great temple of Stonehenge is the most remarkable example. But it is in Egypt that megalithic architecture is seen in its most matured stage, with all the massiveness which so aptly symbolizes barbarian power, but also with a grandeur, due to artistic taste and refinement, in which the ponderous solidity of vast megalithic structures is relieved by the graces of colossal sculpture and of an inexhaustible variety of architectural detail. There appears to be a stage in the development of the human mind in its progress toward civilization when an unconscious aim at the expression of abstract power tends to

beget an era of megalithic art. The huge cromlechs, monoliths, and circles still abounding in many centers of European civilization perpetuate the evidence of such a transitional stage among its prehistoric races. But it was in Egypt that an isolation, begot by the peculiar conditions of its unique physical geography, though also perhaps ascribable in part to certain ethnical characteristics of its people, permitted this megalithic art to mature into the highest perfection of which it is capable. There the rude unhewn monolith became the graceful obelisk, the cairn was transformed into the symmetrical pyramid, and the stone circles of Avebury and Stonehenge, or the megalithic labyrinths of Carnac in Brittany, developed into colonnaded avenues and temples, like those of Denderah and Edfu, or the colossal sphinx avenue of Luxor.

Elaborately-finished axes, hammer-heads, cups, and vases of the late neolithic era serve to illustrate the high stage to which the arts of a purely stone period could be advanced, in the absence of any process of arrestment or change. But long before such a tendency to development into ornamental detail and symmetrical regularity of construction could be brought to bear on the megalithic architecture of the same era, the metallurgic sources of all later civilization had begun to supersede its rude arts. To such remote eras we strive in vain to apply any definite chronology. At best we work our way backward from the modern or known into the mysterious darkness of remotest antiquity, where it links itself to unmeasured ages of geological time. But by such means science has been able to add a curious chapter to the beginnings of British and of European story, involving questions of mysterious interest in relation to the earliest stages in the history of man. The very characteristics which distinguish him in his rudest stage from all other animals have helped from remotest times to perpetuate the record of his progress.

The evidences of the various acquirements and degrees of civilization of the prehistoric races of Britain are derived not only from weapons, implements, pottery, and personal ornaments found deposited in ancient dwellings and sepulchres; but from still older traces supplied by chance discoveries of the agriculturist, miner, and builder, such as the implements of the ancient whalers of the Forth, or the monoxylous oaken canoes dug up from time to time in the valley of the Clyde, or even beneath some of the most ancient civic foundations of Glasgow. Both alike pertain to areas of well-defined historical antiquity, from the very dawn of written history, or of literate chronicles in any form; and both also have their geological records, preserving the evidence of changes of level in unrecorded centuries subsequent to the advent of man, when the whales of the Forth and the canoes of the Clyde were embedded in the alluvium of those river-valleys, and elevated above the ancient tide-marks of their estuaries. Another change of level, possibly in uninterrupted continuance of the ancient upheaval, has been in progress since the Roman invaders constructed their military roads, and built their wall between the Forth and the Clyde, in the 1st and 2d centuries of the Christian era.

By evidence such as this a starting-point is gained whence we may confidently deduce the colonization of the British Islands, and of the north of Europe, at periods separated by many centuries from that in which our island first figures in history. The researches of the ethnologist add to our knowledge of this unrecorded era, by disclosing some of the physical characteristics of the aboriginal races, derived from human remains recovered in cave-drifts, ancient mining shafts, bogs, and marl-pits, or found in the most ancient sepulchres, accompanied by rudest evidences of art; and the researches of Nilsson,

Eschricht, Gosse, Rathke, Broca, and other Continental ethnologists, along with those which have been carried on with minute care in the British Islands, disclose characteristic cranial types indicating a succession of prehistoric races different from the predominant types belonging to the historical period of Europe; and some of them probably contemporaneous with the changes indicated in the periods of archæological time.

The very latest stage of archæological antiquity, when it seems to come in contact with the dawn of historic time, was unquestionably one of complete barbarism, as is sufficiently apparent from its correspondence to that which the intercourse with European voyagers is bringing to a close among the islands of the Pacific. The ancient Scottish subterranean dwellings termed weems (Gaelic *uamhah*, a cave), or "Picts' houses," have been frequently found, apparently in the state in which they must have been abandoned by their original occupants; and from those we learn that their principal aliment must have been shell-fish and crustacea, derived from the neighboring sea-beach, along with the chance products of the chase. The large accumulations of the common shell-fish of our coasts found in some of those subterranean dwellings is remarkable; though along with such remains the stone quern or hand-mill, as well as the ruder corn-crusher or pestle and mortar, repeatedly occur; supplying the important evidence that the primitive nomade had not been altogether ignorant of the value of the cereal grains.

The source of change in Britain, and throughout Europe, from this rude state of barbarism, is clearly traceable to the introduction of metals and the discovery of the art of smelting ores. Gold was probably the earliest metal wrought both from its attractive appearance, and from its superficial deposits, and the condition in which it is frequently found, rendering its working an easy process. Tin also, in the south of Britain, was wrought at the very dawn of history: and, with the copper which abounds in the same district of country, supplied the elements of the new and important compound metal, bronze.

3. This accordingly indicates the transition from the later stone age to the third or *Bronze Period*, which, beginning apparently with the recognition of the native copper as a malleable metal, and then as a material capable of being melted and molded into form by the application of heat, was followed up by the art of smelting the crude ores so as to extract the metal, and that of mixing metals in diverse proportions so as to prepare an alloy of requisite ductility or hardness, according to the special aims of the artificer.

Along with the full mastery of the working in copper and bronze the skill of the goldsmith was correspondingly developed; and the ornaments of this period, including torques, armlets, beads, and other personal decorations and insignia of office, wrought in gold, are numerous, and often of great beauty. The pottery of the same period exhibits corresponding improvement in material, form, and ornamentation; though considering the mimetic and artistic skill shown in the drawings and carvings of the remotest periods, it is remarkable that the primitive pottery of Europe is limited, alike in shape and decoration, to purely arbitrary forms. This in its crudest conventionalism consists almost exclusively of varieties of zigzag patterns scratched or indented on the soft clay. This primitive ornamentation seems so natural, as the first æsthetic promptings of the human mind, that it is difficult, if not in some cases impossible, to distinguish between the simple pottery of comparatively recent origin, recovered on the sites of old American Indian villages, and primitive pottery obtained from British barrows pertaining to centuries long prior to the Christian era. But the fictile ware exhibits an improvement in some degree corresponding to that of the metallurgic art,

which everywhere throughout Europe furnishes weapons, implements, and personal ornaments of the bronze period, characterized by much grace and delicacy in form, and by an ornamentation peculiar in style, but not unworthy of the novel forms and material.

It was long assumed, alike by historians and antiquaries, that the beautiful bronze swords, spear-heads, shields, torques, armillæ, etc., so frequently discovered, were mere relics of foreign conquest or barter, and they were variously assigned to Egyptian, Phœnician, Roman, or Danish origin. But this gratuitous assumption has been disproved by the repeated discovery of the molds for making them, as well as of the refuse castings, and even of beds of charcoal, scoriæ, and other indications of metallurgy, on the sites where they have been found. It has not escaped notice, however, that the transition appears to be an abrupt one from stone to bronze, an alloy requiring skill and experience for its use; and that few examples are recorded of the discovery of copper tools or weapons, though copper is a metal so easily wrought as to have been in use among the Red Indians of America. The inference from this fact is one which all elements of probability tend to confirm, viz., that the metallurgic arts of the north of Europe are derived from a foreign source, whether by conquest or traffic; and that in the beautiful bronze relics so abundant, especially in the British Islands and in Denmark, we see the fruits of that experience which the more ancient civilization of Egypt and Phœnicia had diffused. The direct intercourse between the countries on the Mediterranean and the Cassiterides, or Tin Islands,—as the only known parts of the British Islands are called in the earliest allusions which are made to them by Herodotus, Aristotle, and Polybius,—abundantly accounts for the introduction of such knowledge to the native Britons at a very remote period. Phœnician and Carthaginian merchant ships traded to Cornwall centuries before the white cliffs of Albion were first seen from the Roman war-galleys. Greece also, not improbably, proved a mediator in this all-important transfer. It is at least to be noted that the forms of weapons, and especially of the beautiful "leaf-shaped sword," as figured on the most ancient painted Greek vases, closely correspond to the most characteristic relics of the bronze period in the north of Europe and the British Isles.

In reviewing the characteristics of this bronze period, the disclosures of native art on the American continent supply some singularly interesting and suggestive illustrations. There, throughout the whole northern regions of the North American continent and in the ruder areas of South America, as well as in the West Indian archipelago, a population was found consisting exclusively of rude nomad hunters, in a pure stone period of primitive savage art. Nor does it at all conflict with this that they were to a certain extent familiar with the resources of the rich copper regions of Lake Superior, where that metal is found in enormous masses in a malleable state. This they procured, and not only themselves employed it in the manufacture of weapons, implements, and personal ornaments, but distributed it by barter far down the Ohio and Mississippi valleys, and eastward to the great lakes, to the St. Lawrence valley, and to the Hudson river. Silver and lead are also found in the same rich mineral region in metallic crystals, and were not unknown to the native tribes. But everywhere those metals were cold-wrought, as a mere malleable stone capable of being hammered into any desired shape, but in total ignorance of the influence of fire or the use of alloys.

But wholly distinct from its rude Indian tribes, North America had its semi-civilized Mexicans and South America its more highly civilized Peruvians, who had learned to mine and smelt the ores of the Andes, and make metallic alloys wherewith to fashion for

themselves bronze tools of requisite hardness for quarrying and hewing the solid rock. With these they sculptured the statues of their gods, and reared palaces, temples, and pyramids, graven with elaborate sculptures and hieroglyphics by a people wholly ignorant of iron, which have not unjustly suggested many striking analogies with the megalithic art of ancient Egypt. The *huacas*, or tombs of the Incas of Peru, and also their royal depositories of treasure, have disclosed many remarkable specimens of elaborate metallurgic skill,—bracelets, collars, and other personal ornaments of gold; vases of the same abundant precious metal, and also of silver; mirrors of burnished silver, as well as of obsidian; finely-adjusted silver balances; bells both of silver and bronze; and numerous common articles and tools of copper, or of the more efficient alloy of copper and tin,—all illustrative of the arts and civilization of a purely bronze age.

4. The fourth or *Iron Period* is that in which the art of smelting the ores of the most abundant metal had at length been mastered; and so iron superseded bronze for arms, sword-blades, spear-heads, axes, daggers, knives, etc. Bronze, however, continued to be applied to many purposes of personal ornament, horse furniture, the handles of swords and other weapons; nor must it be overlooked that flint and stone were still employed for lance and arrow-heads, sling-stones, and other common purposes of warfare or the chase, not only throughout the whole bronze period, but far into the age of iron. The discovery of numerous arrow-heads, or flakes of black flint, on the plain of Marathon, has been assumed with good reason to point to the use of such rude weapons by the barbarian host of Darius; and the inference is confirmed by the facts which Herodotus records, that Ethiopian auxiliaries of the army of Xerxes, ten years later, were armed with arrows tipped with stone.

The essential change resulting from the maturing of the iron period lies in the unlimited supply of the new metal. Had bronze been obtainable in sufficient quantity to admit of its application to the endless purposes for which iron has since been employed, the mere change of metal would have been of slight significance. But the opposite was the case. The beautiful alloy was scarce and costly; and hence the arts of the neolithic period continued to be practiced throughout the whole duration of the age of bronze. But iron, though so abundant in its ores, requires great labor and intense heat to fuse it; and it needed the prolonged schooling of the previous metallurgic era to prepare the way for the discovery of the properties of the ironstone, and the processes requisite to turn it to account. Iron, moreover, though so abundant, and relatively of comparatively recent introduction, is at the same time the most perishable of metals. It rapidly oxidizes unless protected from air and moisture, and hence few relics of this metal belonging to the prehistoric period have been preserved in such a state as to illustrate the skill and artistic taste of the fabricators of that last pagan era, in the way that the implements of the three previous periods reveal to us the habits and intellectual status of those older times.

But the iron is the symbol of a period in which pottery, personal ornaments of the precious metals, works in bronze, in stone, and other durable materials, supply ample means of gauging the civilization of the era, and recognizing the progress of man in the arts, until we come at length to connect their practice with definite historical localities and nations, and the names of Egypt and Phœnicia, of Gadir, Massilia, the Cassiterides, and Noricum, illuminate the old darkness, and we catch the first streak of dawn on a definite historical horizon. Thus, with the mastery of the metallurgic arts is seen the gradual development of those elements of progress whereby the triumphs of civilization

have been finally achieved, and man has advanced toward that stage in which the inductive reasonings of the archæologist are displaced by records more definite, though not always more trustworthy, as the historian begins his researches with the aid of monumental records, inscriptions, poems, and national chronicles.

Within the later iron period, accordingly, we reach the era of authentic history. There is no room for doubt that, whatever impetus the Roman invasion may have given to the working of the metals in Britain, iron was known there prior to the landing of Julius Cæsar. Within this archæological period, however, the examples of Roman art and the influences of Roman civilization begin to play a prominent part. To this period succeed the Saxon and Scandinavian eras of invasion, with no less characteristic peculiarities of art workmanship, as well as of sepulchral rites and social usages. In these later periods definite history comes to the aid of archæological induction, while those intermediate elements of historical re-edification, the inscriptions on stone and metal, and the numismatic series of chronological records, all unite to complete a picture of the past replete with important elements for the historian.

The connection between archæology and geology has been indicated, but that between archæology and ethnology is of much more essential significance, and is every day being brought into clearer view. By the investigation of the tombs of ancient races, and the elucidation of their sepulchral rites, remarkable traces of unsuspected national affinities are brought to light; while a still more obvious correspondence of arts in certain stages of society, among races separated alike by time and by space, reveals a uniformity in the operation of certain *human instincts*, when developed under nearly similar circumstances, such as goes far to supply a new argument in proof of the unity of the human race.

The self-evident truths confirmatory of the principles upon which this system of primitive archæology is based, may be thus briefly summed up:—Man, in a savage state, is to a great extent an isolated being; co-operation for mutual and remote advantage, except in war and the chase, is scarcely possible; and hence experience at best but slowly adds to the common stock of knowledge. In this primitive stage of society the implements and weapons which necessity renders indispensable are invariably supplied from the sources at hand; and the element of time being of little moment, the rude workman fashions his stone axe or hammer, or his lance of flint, with an expenditure of labor such as, with the appliances of civilization, would suffice for the manufacture of hundreds of such implements.

The discovery of the metallurgic arts, by diminishing labor and supplying a material more susceptible of varied forms as well as of ornamentation, and also one originating co-operation by means of the new wants it calls into being, inevitably begets social progress. The new material, moreover, being limited in supply, and found only in a few localities, soon leads to barter, and thence to regular trade; and thus the first steps toward a division of labor and mutual co-operation are made. So long, however, as the metal is copper or bronze, the limited supply must greatly restrict this social progress, while the facilities for working it admit of that isolation so natural to man in a rude state; and these, added to the frequent discovery of copper, in its natural condition much more nearly resembling a ductile metal than the ironstone, abundantly account for its use having preceded that of the more abundant metal.

Great experience must have been acquired in earlier metallurgy before the iron ore was attempted to be wrought. In this, co-operation was indispensable; but that once secured, and the first difficulties overcome, the other results appear inevitable. The supply is inexhaust-

ible, widely diffused, and procurable without excessive labor. The material elements of civilization were thereby rendered available, and all succeeding progress might be said to depend on the capacity of the race.

The simplicity which characterizes the archæological disclosures of Scandinavia, Germany, Ireland, and other regions of trans-Alpine Europe lying outside of the range of ancient Greek or Roman influences, has contributed some important aids to the study of prehistoric arts; but the full significance of their teachings has yet to be tested by comparison with the primitive arts pertaining to Egypt, Greece, Asia Minor, and other ancient centers of earliest civilization. To this certain singularly interesting disclosures of very recent date, which some have regarded as at variance with the foregoing classification of archæological epochs, help to furnish the desired materials. The researches of Dr. Heinrich Schliemann on one of the most memorable sites which epic poetry has selected for the mythic beginnings of history, have brought to light what he believes to be actual remains of the Troy of the *Iliad*. Dr. Schliemann began his systematic explorations in 1871, and pursued them, during the available seasons, till the month of June, 1873. With patient assiduity the accumulated debris on the scene of ancient civic settlement was sifted and opened up by regular excavations, till the natural rock was exposed at a depth of upward of 50 feet. Throughout the whole of this, abundant traces of former occupation were brought to light; and so great an accumulation of debris and rubbish upon an elevated site affords undoubted evidence of the vicissitudes of a long-settled center of population. To this specific evidence lent additional confirmation. The foundations of a temple, supposed to be that of the Ilian Athena of the time of Alexander, along with coins, inscriptions, and numerous remains of architecture and sculpture, combined to fix the era of an ancient, but strictly historical, period. At a further depth of upward of 6 feet, broken pottery, implements of bronze, and charred wood and ashes, showed the traces of an older settlement which had perished by fire. But the artificial character of the debris encouraged further research; and when the excavations had been carried to about double the depth, Dr. Schliemann came upon a deposit rich in what may be styled neolithic remains: axes, hammers, spear-heads, and other implements of polished diorite or other stone, weights of granite, querns of lava, and knives and saws of flint abounded, associated with plain, well-executed pottery, but with only two pins of copper or bronze to indicate any knowledge of metal. Continued excavations brought to light additional stone implements and weapons; until at a depth of some 33 feet, well-wrought implements and weapons of bronze, and pottery of fine quality and execution, revealed the traces of an earlier civilization on the same ancient site.

In all this, while there is much to interest, there is nothing to surprise us. Here, near the shores of the Hellespont, at a point accessible to the oldest known centers of civilization,—to Egypt, Phœnicia, Assyria, Greece, Carthage, and Rome,—a civilized community, familiar with the arts of the bronze period of the Mediterranean shores, appears to have yielded to vicissitudes familiar enough to the student of ancient history. After a time the desolated locality tempted the settlement of some barbarian Asiatic horde, such as the steppes of that continent could furnish even now. They were ignorant of metallurgic arts; though probably, like the savage tribes of the New World at the present time, not wholly unaware of the manufacture of implements and weapons of bronze or other metals. Such a local alternation of bronze and stone periods in a region lying in close proximity alike to vast areas of Asiatic

barbarism, and to the most important centers of ancient civilization, in no degree conflicts with a general system of succession of archæological periods. Mexico and Peru, while in a purely bronze age, were overthrown by Spanish invaders. Large portions of their ancient territories were abandoned to utter barbarism, and even now are in the occupation of savage tribes. But the ancient city of Montezuma has been made the capital of a civilized state; the beds of its canals have been filled up, burying therein obsidian, stone, and bronze implements, pottery, sculptures, and much else pertaining to its ante-Columbian era; and it only requires such a fate as its modern history renders conceivable enough, to leave for future ages the buried strata of a civic site revealing similar evidences of the alternation of semi-civilized, barbarian, and civilized ages, on the same long-inhabited site of Toltecans and Aztecs, Indian savages, and modern Mexicans and Spaniards.

That man has everywhere preceded history is a self-evident truth. So long as no scientific evidence seemed to conflict with a long-accepted chronology in reference to the antiquity assigned to the human race, it remained unchallenged, though the like computation had been universally rejected in reference to the earth as the theater of his history, and we were content to regard the prehistoric era of man as no more than a brief infancy of the race. But the investigations and disclosures of recent years in reference to the whole prehistoric period have involved of necessity a reconsideration of the grounds on which a definite antiquity of comparatively brief duration has been assigned to man; and the tendency at present is rather to exaggerate than to diminish the apparent antiquity of the race. The nature and extent of the evidence which has thus far rewarded intelligent research have been sufficiently indicated above; and as it is still far from complete, the student of archæology will act wisely in pushing forward his researches, and accumulating and comparing all available evidence, without hastily pronouncing any absolute verdict on this question. But, without attempting to connect with any historic chronology the men of the English drift, or the troglodytes of the mammoth or reindeer periods of France, it may be useful, in concluding this summary of primitive archæology, to glance at the origin of civilization, and the evidences of the antiquity of what appear to constitute its essential elements.

Everywhere man seems to have passed through the same progressive stages: First, that of the *savage* or purely *hunter state;* a condition of precarious instability, in which man is most nearly in the state of a mere animal subsisting on its prey. It is the condition of nomad life, incompatible with a numerous or settled population; exhausting the resources of national being in the mere struggle for existence, and therefore inimical to all accumulation of the knowledge and experience on which human progress depends. In this primitive state, man is disclosed to us by the evidence with which the archæologist now deals. He appears everywhere in this first stage as the savage occupant of a thinly-peopled continent, warring with seemingly inadequate means against gigantic carnivora, the contemporary existence of which is known to us only by the disclosures of geological strata or ossiferous caves, where also the remains of still more gigantic herbivora confirm the idea of man's exhaustive struggle for existence. The nearest analogy to such a state of life is that of the modern Esquimaux, warring with the monstrous polar bear, and making a prey of the gigantic cetaceæ of Arctic seas. Through how many ages this unhistoric night of European man may have preceded the dawn of civilization it is at present vain to speculate. But this is noticeable, that there is no inherent

element of progress in a people in the condition of the Esquimaux. To all appearance, if uninfluenced by external impulse, or unaffected by any great amelioration of climate, they are likely to prolong the mere struggle for existence through unnumbered centuries, armed, as now, with weapons and implements ingeniously wrought of bone, ivory, and stone, the product of the neolithic arts of this 19th century.

To this succeeds the second or *pastoral state*, with its flocks and herds, its domesticated animals, and its ideas of personal property, including in its earlier stages that of property in man himself. It pertains to the open regions and warmer climates of the temperate zone, and to the elevated steppes and valleys of semi-tropical countries, where the changing seasons involve of necessity the wandering life of the shepherd. This accordingly prevents the development of the arts of settled life, especially those of architecture ; and precludes all idea of personal property in the soil. But the conditions of pastoral life are by no means incompatible with frequent leisure, reflection, and consequent intellectual progress. Astronomy has its origin assigned to the ancient shepherds of Asia ; and the contemplative pastoral life of the patriarchs Job and Abraham has had its counterpart in many an Arab chief of later times.

The third or *agricultural stage* is that of the tillers of the soil, the Aryans, the ploughers and lords of the earth, among whom are developed the elements of settled social life involved in the personal homestead and all the ideas of individual property in land. The process was gradual. The ancient Germans, according to the description of Tacitus, led the life of agricultural nomads ; and such was the state of the Visigoths and Ostrogoths of later centuries. But this was in part due to the physical conditions of trans-Alpine Europe in those earlier centuries. Long ages before that, as the ancient Sanscrit language proves, the great Aryan family, of which those are offshoots, had passed from the condition of agricultural nomads to that of lords of the soil among a settled agricultural people. They had followed up the art of plowing the soil with that of shipbuilding and "plowing" the waves. They were skilled in sewing, in weaving, in the potter's art, and in masonry. Their use of numbers was carried as high at least as a hundred before they settled down from their nomad life. They had domesticated the cow, the sheep, the horse, and the dog ; and their *pásu* or feeders already constituted their *pecus*, their wealth, before the *pecunia* assumed its later forms of currency. They had also passed through their *bronze* and into their *iron* period ; for their language shows that they were already acquainted with the most useful metals as well as with the most valuable grains.

The whole evidence of history points to the seats of earliest civilization in warm climates, on the banks of the Nile, the Euphrates, the Tigris, the Indus, and the Ganges. The shores of the Mediterranean succeeded in later centuries to their inheritance, and were the seats of long-enduring empires, whose intellectual bequests are the life of all later civilization. But trans-Alpine Europe, which is now yielding up to us the records of its prehistoric ages, is entirely of modern growth so far as its historic civilization is concerned, and wherever it extends toward the northern verge of the temperate zone it is even now in its infancy. Here, then, we trace our way back to the first progressive efforts of reason, and find man primeval, in a state of nature, in the midst of the abundance pertaining to a genial and fertile climate, which rather stimulates his æsthetic faculty than enforces him by any rigorous necessity to cultivate the arts for the purposes of clothing and building. Thus employing his intellectual leisure, he begins that progressive elevation which is as

consistent with his natural endowments as a rational being as it is foreign to the instincts of all other animals. He increases and multiplies, spreads abroad over the face of the earth, clears its forests, drains its swamps, makes its rivers and seas his highways, and its valleys and plains his fertile fields and pasture-grounds. Cities rise, with all the fostering influences of accumulated wealth and settled leisure, and with all the stimulating influences of acquired tastes and luxurious desires. The rude pictorial art—not ruder on the graven ivory of the troglodytes of the Madelaine cave than on many a hieroglyphic drawing of the catacombs and temples of Egypt—employed in picture-writing, passes by a natural and inevitable transition from the literal representations of objects to the symbolic suggestion of ideas, to a word-alphabet, and then to pure phonetic signs. The whole process is manifest from the very infancy of Egyptian picture-writing, as crude as that with which the Indian savage still records his deeds of arms on his buffalo-robe, or carves the honors of the buried warrior on his grave-post. Letters lie at the foundation of all high and enduring civilization, yet we can thus trace them back to their infantile origin; and so onward in their slow transformations, as in the mingled pictorial and phonetic writing of the Rosetta stone hieroglyphics of the age of the Ptolemies. Through Phœnician, Greek, and Roman modifications, they have come down to us as the arbitrary symbols of sounds which the voice combines into articulate speech.

And as it is with letters so it is with man's *arts*,—his drawing, carving, sculpture, architecture, weaving, pottery, metallurgy; and so with his *science*,—his astrology, astronomy, geometry, alchemy, and all else. The beginnings of all of them lie within our reach. We can trace back the measurements of solar time to the crudest beginnings of more than one ancient nation, with a year of 360 days. This, corrected to the definite approximation to the true solar year of a period of 365 days, became the vague year of the Egyptians, with the great Sothiac cycle of 1460 years, clearly pointing to a system of chronology which could not have been perpetuated through many centuries without conflicting with the most obvious astronomical phenomena as well as with the recurring seasons of the year.

Man is, after all, according to the boldest speculations of the geologist, among the most modern of living creatures. If indeed the theory of evolution from lower forms of animal life is accepted as the true history of his origin, time may well be prolonged through unnumbered ages to admit of the process which is to develop the irrational brute into man. But regarding him still as a being called into existence as the lord of creation endowed with reason, the demonstration of a prolonged existence of the race, with all its known varieties, its diversities of language, and its wide geographical distribution under conditions so diverse, tends to remove greater difficulties than it creates. No essential doctrine, or principle in morals, is involved in the acceptance or rejection of any term of duration for the human race; and the idea of its unity, which for a time was scornfully rejected from the creed of the ethnologist, is now advocated by the evolutionist as alone consistent with the physical, mental, and moral characteristics common to savage and civilized man, whether we study him amid the traces of palæolithic osteology and arts or among the most diverse races of living men.

The process of research and inductive reasoning thus applied by the archæologist to the traces of primitive art and the dawn of civilization, is no less applicable to all periods. The songs and legends of the peasantry, the half-obliterated traces of ancient manners, the fragments of older languages, the relics of obsolete art, are

all parts of what has been fitly styled "unwritten history," and furnish the means of recovering many records of past periods which must remain forever a blank to those who will recognize none but written or monumental evidence.

Proceeding to the investigation of this later, and in most of the higher requirements of history, this more important branch of historical evidence, the archæologist has still his own special departments of investigation. Tracing the various alphabets in their gradual development through Phœnician, Greek, Roman and other sources, and the changing forms which followed under the influences of Byzantine and mediæval art, a complete system of palæography has been deduced, calculated to prove an important auxiliary in the investigation of monumental and written records. Palæography has its own rules of criticism, supplying an element of chronological classification altogether independent of style in works of art, or of internal evidence in graven or written inscriptions, and a test of genuineness often invaluable to the historian.

Architecture, sculpture, and pottery have each their historical value, their periods of pure and mixed art, their successions of style, and their traces of borrowed forms and ornamentation, suggestive of Indian, Assyrian, Egyptian, Phœnician, Punic, Greek, Etruscan, Roman, Arabian, Byzantine, Norman or Renaissance influences. Subordinate to those are the pictorial arts combined with sculpture and pottery, from earliest Egyptian, Greek, or Etruscan art to the frescoes and paintings of mediæval centuries; and the rise of the art of the engraver, traceable through ancient chasing on metals, mediæval niello-work, graven sepulchral brasses, and so on to the wood blocks, whence at length the art of printing with movable types originated. And as in the Old World, so in the New, the progress of man is traceable from rudest arts of stone and copper to the bronze period of Mexico and Peru, where also architecture, sculpture, and pottery preserve for us invaluable materials for the elucidation of that prehistoric time which only came to an end there in the year 1492 A.D.

Heraldry is another element by means of which archæology provides trustworthy canons of criticism in relation to written and unwritten mediæval records. The seals and matrices, sepulchral sculptures, and engraved brasses, along with an extensive class of the decorations of ecclesiastical and domestic architecture, all supply evidence whereby names and dates, with confirmatory collateral evidence of various kinds, are frequently recoverable. From the same sources also the changing costume of successive periods can be traced, and thus a new light be thrown on the manners and customs of past ages. The enthusiastic devotee is indeed apt at times to attach an undue importance to such auxiliary branches of study; but it is a still greater excess to pronounce them valueless, and to reject the useful aids they are capable of affording.

No less important are the illustrations of history, and the guides in the right course of research, which numismatics supplies, both in relation to early and mediæval times. On many of those points the historian and the archæologist necessarily occupy the same field; and indeed, when that primitive period wherein archæology deals with the whole elements of our knowledge regarding it as a branch of inductive science, and not of critical history, is past, the student of antiquities becomes to a great extent the pioneer of the historian. He deals with the raw materials: the charters, deeds, wills, grants of land, of privileges or immunities, the royal, monastic and baronial accounts of expenditure, and like trustworthy documents; by means of their palæography, seals, illuminations, and other evidence, he fixes their dates, traces out the genealogical relationships of their authors, and in various ways

prepares and sifts the evidence which is to be employed anew by the historian in revivifying the past. Architecture and all departments of the fine arts, in like manner, supply much evidence which, when investigated and systematized by a similar process, adds valuable materials to the stock of the historian, and furnishes new sources for the illumination of past ages. Such is a sketch of the comprehensive investigations embraced under the name of archæology, which, carried on by many independent laborers, and in widely varied fields of research have contributed important chapters of human history, and revivified ages long buried in oblivion, or at best but dimly seen through distorting media of myth and fable.

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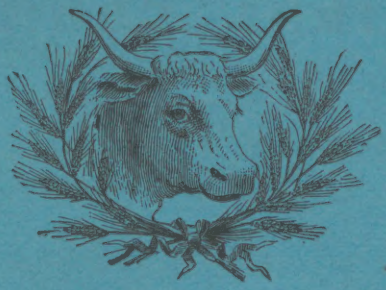

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